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MEASLES

THE subject of measles may appear to be a rather hackneyed and trite medical condition upon which to give a talk today. However, there are certain facts about that disease that I should like to bring out, and there are certain recent developments which I propose to discuss, and which I think may be of interest to you. Necessarily, I cannot bring the patients before you on account of the danger of transmission of the disease, but I can give to you at the onset of the clinic a general summary of our observations on this particular disease which has been epidemic in New Orleans in the past few months. During this time, here at the Charity Hospital, the contagious-disease service has been more than swamped by the large number of patients who have applied for admission. In fact, for the first time in its history, I believe, Charity Hospital has been obliged to refuse admission to patients suffering from measles, unless there was present some complication which would warrant more intensive treatment and more careful watching than could be given in the economically restricted homes from which the patients come to this charity hospital.

The epidemic of measles started shortly after Christmas, beginning at the New Year. The cases increased in number until the above condition was present, along about March 1st. By May 1st the disease frequency had so materially subsided

that any and all measles patients seeking admission to the hospital could be accommodated.

ADMISSION IN 1927 TO THE MEASLES WARDS AT CHARITY HOSPITAL

January	89
February	111
March	86
April	56
May	14
Total	356

It is an aphorism in medicine that measles is the most contagious of contagious diseases. Practically all members of an urban community have had the disease by the time they reach adult life, whereas in the suburban and rural communities necessarily the contact with large numbers of people does not take place and the incidence is not so great. As an example of the frequency with which the history may be obtained from an adult having had measles, I might quote from a recent paper by Barach[1] who, in a large number of unselected medical cases apparently of more than average intelligence, found that in 1530 individuals, a history of measles was obtainable in approximately 1250. A far greater proportion of these individuals had had this disease than any other contagious disease. The contagion of measles is present in the nasal and buccal secretions, as well as in the blood, as I will show. There is some question whether the disease may be carried by a third person or by fomites, or whether it is due entirely to direct contagion. From the experience in this recent epidemic it would hardly seem possible that direct contagion is essential for the transmission of the disease. All over the city, at about the same time, sporadic cases appeared with a simultaneousness which makes it seem very unlikely that the disease was instituted by direct contact. Most of the children were very small, too small, in fact, to congregate in moving picture houses, schools, and similar places. Of course these sporadic cases acted as niduses from which the disease spread rapidly to epidemic proportions.

[1] Barach, Joseph H.: Etiological Factors in Diabetes, Arch. Int. Med., 1927, xxxix, 636.

Epidemics of measles are common. The usual story is that they appear approximately every four or five years. The children at this time develop the disease and become immune, and it is not until another group of children come along that the disease again becomes epidemic. This repeats itself in a definite cycle of years.

Immunity.—We have been very much interested in studying immunity to measles[1] and observing lack of immunity in some babies whose mothers have not had the disease. It is generally stated in most text-books that children under one year of age are immune to the disease, and those under six months practically never develop it. It is further stated that it is doubtful if the immunity is conveyed by the mother. Such is not the case, it has been my observation. During this recent epidemic there have been born in the maternity wards of the hospital babies who developed the disease shortly after the mother had contracted it. The pregnant mothers would develop measles, and would be transferred to the contagious disease ward. Children would be born immediately or shortly afterward and if they did not have the disease when they were born, they would develop it very shortly afterward. There were 6 such cases, one mother having twins, both of whom developed measles. On the other hand, pregnant women who did not develop measles, and who gave a history of having had the disease, apparently conferred immunity upon their children, because in no case did a child develop the disease if its mother had already had it. In other words, immunity, as in other bacterial diseases, is conveyed to the newborn babe by the maternal blood. As I will mention more in detail in a succeeding paragraph, an organism had been isolated which was obtained by cultures of the blood, and from which was prepared a twenty-four-hour bouillon culture filtrate which was used as a test for immunity. The test is performed very much the same way as is the Schick test. Two-tenths of a cubic centimeter of the filtrate of a dilution of 1 : 10 was employed with the usual intradermal technic. With this particular filtrate it was found that small children, who had not had the disease, and

[1] Musser, J. H.: Proc. Soc. Exper. Biol. and Med., 1927, xxiv, 518.

adult non-immunes gave a very pretty and unquestionable skin reaction, manifested by the appearance of a circumscribed area of erythema, measuring from 2 to 4 cm. in diameter, and appearing from eighteen to thirty-six hours after injection. On the contrary, individuals who had had the disease did not give reactions. The exception to this was in two students who were presumed to have had measles, but gave a faint reaction. On retesting, one was found to be negative, and the other positive when a stronger dilution of the filtrate was employed. Children with a negative skin reaction did not develop measles, whereas three of the eight children with a positive reaction, indicating lack of immunity to the causative organism, developed measles. It is interesting to note that one child with a faint erythema, which was supposed to be due to measles and for which he was transferred to the measles ward and kept there for three weeks, had had a negative reaction. The faint erythema disappeared in a very few hours and was apparently non-specific in origin. The child was kept in the measles ward with a fear of the possibility of his spreading the disease to the children in the children's surgical ward, and he never developed the disease. Convalescent children invariably gave a negative reaction after the rash had disappeared. The positive reaction would persist for a few hours after the onset of the rash, after which period it would become negative. Tunnicliffe[1] was able to obtain a skin reaction in susceptible individuals with the organism she has isolated and Ferry and Fisher[2] did the same with their bacterium.

Bacteriology.—In 1917 Ruth Tunnicliffe described an organism which she isolated from the blood of children suffering from this disease, measles. For some reason or another, this organism has not generally been considered to be the causal germ of the disease by bacteriologists and pediatricians. Coronia[3] has isolated a somewhat similar organism, while Ferry and Fisher[4]

[1] Tunnicliffe, R.: Jour. Infect. Dis., 1925, xxxviii, 193.

[2] Ferry, N. S., and Fisher, L. W.: Jour. Amer. Med. Assoc., 1926, lxxxvi, 932.

[3] Coronia, Pediatria, 1923, xxxi, 801.

[4] Loc. cit.

have also grown an organism which, while they do not say so, would tend to confirm Tunnicliffe's original findings, as their organism seems to be essentially the same. Duval isolated from the blood of 6 patients an organism which he thinks resembles very closely that of Tunnicliffe's, but which does not resemble it in all particulars. Duval[1] is of the opinion that this organism is the same as that described by Tunnicliffe. Most assuredly, in each one of the 6 cases the same organism was isolated. Furthermore, using a somewhat different technic, modified from that of Ferry and Fisher, Dr. Butler, of our department, grew an organism in 2 cases which was culturally and tinctorially similar to that of Duval. That this organism is the cause of measles, or at least is the cause of measles in the present epidemic, would seem to be confirmed by the animal experimentations made by Duval, and by the immunologic experiments that I made.

Incubation Period.—The opportunity was afforded of observing the period of incubation in several cases, and it was found to be the usual time of ten or eleven days.

Symptoms.—The symptomatology of measles presents a vivid picture. None of the infectious diseases are quite so easy to diagnose. The early appearance of Koplik's spots, the characteristic coryza, and the characteristic rash is a diagnostic syndrome which is typical in the great majority of cases. In the early cases appearing at Charity Hospital it was noted that the rash was very much more erythematous than in the latter cases that came in during the last part of the epidemic. In many of these late cases the rash was a pale red and in its distribution was found to be very much less widely scattered over the body than in the early cases. The later cases, incidentally, were usually more prone to complications than were the patients who had a pronounced, widespread, diffuse maculopapular eruption.

The typical appearance of the rash of the negro is, of course, concealed by the dark color of his skin so that, at times, the lesion is somewhat hard to see. We have found that the best way to diagnose the rash in colored children is either by the sense of

[1] Proc. Soc. Exp. Biol. and Med., 1927, xxiv, 517.

touch, feeling the scattered elevations over the body, or, even better, to get the child at right angles to the light, when the elevations with their shadows can be very distinctly seen. They are seen so clearly that one gets the impression that in the negro the elevation of the eruption is greater than in the white individual.

Cough is a constant symptom. The cough is a non-productive, dry, irritating cough which apparently is more severe in the children with the florid skin lesions than in those with the paler eruptions. This is as would be expected, because the rash extends down into the mucous membranes of the trachea and bronchi, producing a specific tracheobronchitis. In some cases the cough is so severe and so pronounced that it is easy to believe that a bronchopneumonia is present. The prompt disappearance of this distressing symptom with the fading of the rash in most cases was so characteristic that it resembled the improvement in an individual who has had his crisis in pneumonia.

Complications.—The only severe cases of measles, in the sense that the individual died, were those children in whom complications occurred. Bronchopneumonia was found in practically every one which came to autopsy. Many children developed bronchopneumonia which manifested itself not only by the cough and physical signs, but also by the continuation of the temperature past the period in which the temperature should drop. The time interval of the various stages of measles is so sharply outlined that one can expect the temperature to go down to normal within forty-eight hours after the heighth of the eruption. If it continues, it is almost certain that one of the complications has arisen. Otitis media and bronchopneumonia are the two complications that have caused the most trouble. My statistics on the occurrence of bronchopneumonia and otitis are of little value except as to the Charity Hospital, because, at the heighth of the epidemic, only children were admitted who were extremely ill, and who usually presented one of these two severe complications. These statistics would not show the incidence of bronchopneumonia in the general population. Furthermore, it would not be fair to quote them, as the incidence

of bronchopneumonia in an institution in which there are a large number of cases of measles is very much greater than in the home. The bronchopneumonia that we observed is diagnosed by the persistence of fever and cough, and by the presence of râles of all types in the chest. It is not possible to localize definite areas of solidification, despite the fact that this pneumonia of a true lobular type was found so extensive that at autopsy, on section of the lung, it would appear almost solid. It is interesting to observe that, of the cases that did come to autopsy, all of them presented the typical lobular type of pneumonia. In only 1 case, which came in at the end of the epidemic, was there found the type of pneumonia which was so common during the great war, and which was caused by hemolytic streptococcus. In this particular type of pneumonia, which appeared often some days after convalescence had begun, pus formation was the outstanding characteristic, as has been so graphically described by observers in the army camps during the war. Marked involvement of the pleura and walled-off empyemata are invariable findings, whereas in none of our children pus was found at any time in the pleural cavity, excepting this one and almost last case, in which there were found, in addition, half a dozen or more abscesses in the parenchyma of the lung, and an intensive fibrinous pleurisy with several small abscesses.

Encephalitis.—A complication which is apparently extremely rare, and which, apparently, has not been very generally recognized, as infrequent reference is made to it under this head in recent medical literature or in text-books dealing with measles, is that of encephalitis. Severe nervous complications are spoken of, but the encephalitic etiology is not mentioned. This condition was definitely proved to occur to 6 of our patients who died and who came to autopsy. In addition, there were 6 other patients in whom we believe this complication occurred. The complication was not diagnosed antemortem in 2 of the fatal cases. In the other 4 patients it was suspected and such a diagnosis was made. Practically all of our children were small children, in whom the subjective complaints of cerebral involvement were minimum. The objective findings were often hard

to elicit. The most outstanding symptoms in this case were associated with irritability and apathy. The irritability became in some cases so severe as to be associated with true delirium; the apathy varying from simple dulness—lack of interest in the surroundings, or difficulty in arousing—to a stupor which was so deep as to make it virtually impossible to arouse the child. Associated with this was a high temperature which was present in all the patients. I would particularly accentuate this high temperature, often going up to 107° F. or fractions higher. In the children in whom irritability and delirium were present it was quite common to find that there was a more or less generalized spasticity of the peripheral muscles. We did not observe in any case paralysis of the muscles supplied by the cranial nerves. One child had a slight paralysis of the left side of the body. Reflexes were most irregular and variable. The reflexes were found to be exaggerated or to be diminished or to be normal. Rigidity of the neck muscles was present in those in whom there was a general muscle spasticity, but not in the other children.

The spinal fluid was under pressure; globulin was increased, but never so markedly as we get in pure inflammatory meningeal lesions; the cell count was increased, due very largely to polymorphonuclear cells. If the cell count fell, it was due to the disappearance of these cells, so that the proportion of lymphocytes became increased, with a reduction in the total count. The fluid was clear, and culture from the fluid was invariably negative. White cell count was increased, with a high proportion of polymorphonuclears, Case III, for example, showing a total white count which varied between 26,000 and 30,500, polymorphonuclear cells always being between 88 and 89 per cent. At autopsy the brains were softer than normal, with minute hemorrhages scattered more or less thickly throughout the gray and the white matter, while occasionally a larger hemorrhage could be found. The meninges would be intensely injected, but there would not be any actual exudate on the membranes of the brain and spinal cord.

Noma.—This complication occurred in only 1 case, admitted to the hospital with a small patch of gangrene of the buccal

mucous membrane. The gangrenous area extended rapidly in all directions so that in five days, just before the death of the child, the lesion involved the cheek, lips, floor of the mouth and roof of the mouth, and the lower portion of the nose.

Fig. 76.—Noma in a child with measles.

Hemorrhagic Measles.—Purpura as a complication of measles was observed in only 1 case. In this small boy the extremities and the greater part of the body were covered with well-marked purpuric areas, in which the maculopapular eruption of the disease was present. Despite the fact that it is generally considered that this particular type of measles is serious, the course of the disease in this case was extremely mild. At no time was the child especially sick, and his convalescence was rapid.

Treatment.—We endeavored to follow a series of cases treated with a specific serum, which is put out by one of the large pharmaceutic houses that makes biologic preparations. This serum was to be used only for experimental purposes, and the manufacturers stated that they had not as yet achieved the standardization which would make the product of value to the general profession. With this preparation, which was given intramuscularly as soon as the child entered the hospital, we were not able to see any definite results. The serum was given to alternate cases as they entered the medical service. The

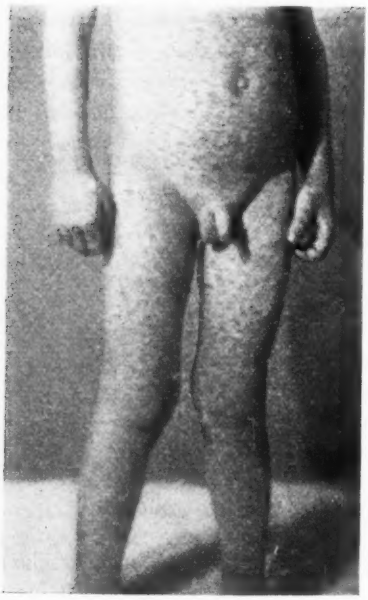

Fig. 77.—Hemorrhagic measles.

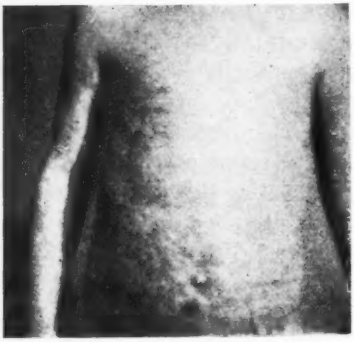

Fig. 78.—Hemorrhagic measles.

children who were given the serum showed no difference in their clinical course from that manifested by the children who did not receive it, so that we are not able to sustain the idea that the serum was in any sense a specific.

Aside from the specific therapy, treatment otherwise was very largely symptomatic and the children were given the usual mild cough sedatives and alkaline diuretics. In the case of middle ear infection, we tried several types of local antiseptics, and probably got the most satisfactory results from gentian-violet, but the difference in these various preparations was so slight that it would be impossible to say that one was superior to the other. Undoubtedly, the good effect of the oral irrigations depends upon the cleansing effect of whatever disinfectant is used, rather than upon its antiseptic value.

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SCARLET FEVER

SCARLET fever is an acute infectious disease, characterized usually by an intense inflammation of the upper respiratory mucous membrane, but more especially that of the pharynx, and commonly accompanied by an erythematous skin eruption. The angina and swelling of the regional lymph-nodes are among the first signs of the malady. Soon there appears on the face, and later over the entire body, the characteristic clinical feature of the disease, known as the scarlatiniform rash or exanthem. The angina represents the primary focus of infection except in those cases in which the infection gains entrance through surgical and other wounds of the cutaneous tissues.

As a rule, scarlet fever is a localized infection, in which the specific excitant remains and carries on its activity at the primary site of invasion. However, the infection may become generalized and a true septicemia established. It is in these instances that pneumonia and other serious complications develop.

Transmission.—Infection is transmitted mainly by the nasopharyngeal secretions during the febrile stage of scarlatina. In ordinary, uncomplicated cases the infectiousness ends with the disappearance of the "rash" and pyrexia, but when otitis media, pneumonia, or other open lesions persist, infectiousness may last for a longer period. Thus, scarlet fever is a source of danger to the susceptible person during the course of (1) the typical case from the beginning of the throat infection until convalescence, (2) the case where persistent secondary lesions such as otitis media continue after convalescence, and (3) the mild unrecognized case.

Etiology.—The question concerning the etiology of scarlet fever is now generally considered as settled. While it has always been traditionally held that streptococci played an important though secondary rôle in scarlatina, there are those who long ago regarded some one of this particular group of microorganisms as the primary cause of the disease. Several decades before the work of Dick and Dick[1] on the etiology of scarlet fever, which it would seem has finally established the true significance of streptococci in the disease, a number of investigators had furnished evidence that this organism was the causal excitant. Class[2] in 1899 described a streptococcus isolated from cases of scarlatina, which upon injection into pigs induced an erythematous infection. Baginsky and Summerfield[3] in 1900 reported the presence of streptococci in the heart's blood of fatal cases of scarlet fever, and expressed the belief that the acute illness and rapid mortality precluded the possibility of the streptococcus being only a secondary invader. In 1920 the specificity of the streptococcus in scarlatina was determined serologically by Moser and von Pirquet,[4] and their observations were later confirmed by Bliss[5] and Tunnicliffe.[6] Thus it would appear that the streptococcus was not only regarded, but proved the primary cause of the disease years before the published work of Dick and Dick.

Late in the last century it was observed that streptococci in great numbers occurred in the acute anginal lesion of early scarlatina, which fact perhaps more than any other lead investigators to regard scarlet fever as nothing more than a streptococcal infection. Certainly one sees frequently severe streptococcal septicemias, which primarily are local anginal infections, develop all the symptoms of scarlet fever including the exanthem. It would seem likely, that in the final analysis we will come to regard scarlet fever as one of many conditions arising from strep-

[1] Dick and Dick, Jour. Amer. Med. Assoc., 1924, 82, 301.
[2] Class, Phila. Med. Jour., 1899, 3, 26.
[3] Baginsky and Summerfield, Berl. klin. Woch., 1900, 40, 720.
[4] Moser and von Pirquet, Centb. f. Bakt., Orig., 1920, 34, 560.
[5] Bliss, Bull. Johns Hopkins Hosp., 1920, 31, 173.
[6] Tunnicliffe, Jour. Infect. Dis., 1921, 29, 91.

tococcal infection. Therefore it is not improbable that the specific cause of erysipelas, acute inflammatory rheumatism, puerperal sepsis, and scarlatina produce analogous toxemias and are biologically closely related.

Essential Pathology.—The primary lesion in scarlet fever is essentially acutely exudative in character. Extensive parenchymatous degenerations occur for the important internal organs as a result of the absorption of toxin from the focus of infection which in the majority of instances is of the throat. When the disease starts in the mucosa of the upper respiratory tract, considerable areas of the nasopharynx become covered with a fibrino-purulent exudate which often is indistinguishable from the pseudomembrane of diphtheria. The throat lesion is commonly an extremely destructive process, so also that of the regional lymph-nodes which may suppurate and form what is termed the scarlatinal bubo.

Laryngeal and tracheal lesions occur only in the more severe cases of scarlet fever, and from these situations an extension of the process into the lungs is a likely complication. Such a pneumonia is always bronchial or lobular in character, and usually fatal.

Perhaps more important than the pneumonia, because of its serious morbidity and after consequences, is the nephritis in scarlatina. Kidney lesions, particularly of the parenchyma, are a common accompaniment and sequel in all forms of the disease. Not infrequently the nephritis is the only sign on which the physician bases the diagnosis of scarlet fever, and this is especially true for the non-exanthematous type of the disease.

There are two forms of scarlatinal nephritis, one which is primary and involves the glomeruli, the other, which is secondary, occurs in the supporting or interstitial tissues of the kidney. It is the latter that has far-reaching significance, since it undoubtedly is one of the precursors of chronic interstitial nephritis in after life (Bright's disease). However, the occurrence of an acute, scarlatinal nephritis does not inevitably mean the production of a progressive, chronic, diffuse nephritis. It may be

pointed out in this connection that the acute nephritis is more often the cause of myocardial changes than is the case with the toxin of the specific excitant. While cardiac degenerations occur as a result of the direct action of the streptococcal toxin, these are unimportant as compared to the cardiac lesion produced indirectly by the nephritis. We have in mind here the hypertrophy of the heart in scarlet fever, which is rapid and alarming where there is serious disturbance of kidney function.

The exanthem in scarlatina, from which the disease takes its name, is similar to the enanthem or angina, though of a much milder inflammatory character. This striking lesion of the skin is multiple and at first appears as minute, discrete red flecks, coalescing later to form a diffuse erythematous mantle over the entire body. The rash is undoubtedly of toxic origin, and appears synchronously with the second toxemia[1] of the disease. Its disappearance occurs during the early period of the development of neutralizing antibodies. That the rash is caused by streptococcal toxin is proved by the permanent blanching which is occasioned when the lesion is injected with specific antitoxin.

The blanching of the rash with intradermal injection of antitoxin is accounted for through the neutralization of the toxin present in the erythematous skin. The toxin most likely produces the rash through its action upon the vasomotor mechanism for the small cutaneous vessels, which results in their dilatation and subsequent leakage of content. Neutralization of the toxin *in situ* removes the vasomotor disturbing factor, and, in consequence, the vessels regain the normal, and the erythema disappears.

Regarding the microscopic appearance of the scarlatinal exanthem, each fleck is a focus of acute inflammation of the corium with a moderate outpouring of neutrophiles, erythrocytes, and serum which take up a perivascular position. The leukocytic infiltration may extend into the epidermis. In the septicemic type of the disease the exanthem may present a hemorrhagic appearance due to the action upon the cutaneous vessels of colonized streptococci. There is nothing distinctive or charac-

[1] Duval, S. M. Jour., 1926, 19, 858.

teristic for the pathology of the scarlatinal exanthem, unless it be the protozoal-like bodies (protoplasmic degenerations) in the epithelial cells and pericellular spaces. These bodies were first noted by Mallory[1] and confirmed by Duval,[2] and, as pointed out by them, differentiates the skin lesion of scarlet fever microscopically from all other exanthems.

Nature of the Toxin.—Although the streptococcal etiology of scarlet fever is now pretty generally accepted, there is much that is imperfectly understood concerning the nature of the toxin. There are those, who, recognizing the streptococcus as the specific cause, regard the toxin as a soluble poison similar in its action to the toxin of diphtheria, while others regard the toxin as an intracellular product.

To fully understand the relationship of the various lesions in scarlet fever, and their manner of production, it is necessary to know the nature of the toxic principle involved, otherwise the factors responsible for the multiplex pathology will remain more or less obscure. Whether the specific poison is in part or whole microbic or of host derivative, we, at present, have no very clear conception.

It is claimed by some authors that the active principle of a number of pathogenic streptococci, including scarlatinal strains, are toxic moieties, not to be distinguished serologically from one another. Eagles[3] states that the toxic filtrates from a widely-distributed group of hemolytic streptococci give rise to a skin reaction indistinguishable from the Dick reaction. This author also says that the toxic filtrate of hemolytic strains, regardless of their source, are neutralized by scarlatinal antitoxin. Williams[4] found that streptococci from cases of bronchitis and osteomyelitis yielded toxic filtrates which were neutralized by convalescing scarlet fever serum. Birkhaug,[5] working with strains from erysipelas, determined that the toxic filtrates produce a

[1] Mallory, Jour. Med. Res., 1904, 10, 483.
[2] Duval, Virchow Arch. für Path. Anat. u. Physiol., 1904, 190, 51.
[3] Eagles, Brit. Jour. Exper. Path., 1926, 7, 286.
[4] Williams, Amer. Pub. Health, 1925, 15, 129.
[5] Birkhaug, Bull. Johns Hopkins Hosp., 1925, 36, 248.

skin reaction similar to scarlet fever toxin; while Lash and Koplan[1] have obtained a toxic filtrate from the streptococcus of puerperal sepsis.

Dick and Dick believe that the active principle of Streptococcus scarlatinæ is a true microbic toxin, which is elaborated during the culture's growth activity. They base their belief in a soluble toxin upon the neutralization of the toxic substance in the culture-filtrate, which, according to them, is proof that the toxin is a true poison capable of forming an antitoxin. Dochez[2] apparently regards the toxic principle not in the nature of a soluble poison, because of his failure to secure from the *in vitro* grown culture a toxin which would induce a corresponding antitoxin. However, it is his expressed opinion that the natural and experimental immunity is antitoxic in nature, from which it seems implied that, while he regards the streptococcus as incapable of producing *in vitro* a soluble toxin, it, nevertheless, occasions *in vivo* an antitoxic immunity. Presumably Dochez infers that the scarlet fever streptococcus elaborates a soluble toxin *in vivo* and not *in vitro*. Rosenow[3] states that the neutralizing principle of streptococcal immune serum is removed by "washed bacterial bodies," and that the endotoxin within the heat-killed streptococcal cell is likewise neutralized. The demonstration of thermolabile and thermostabile toxic moieties of the streptococcal cell he offers as proof of the identity of a soluble toxin and endotoxin. Duval and Hibbard[4] show that no soluble toxin is produced by the scarlatinal streptococcus *in vitro*. In a more recent article these authors[5] state that the filtrate from the forty-eight-hour grown bouillon culture is non-toxic for the experimental animal, while the washed coccal bodies of the same culture is highly toxic.

With regard to the nature of the scarlatinal toxin, it is not known whether it is an entity that exists as an independent moiety

[1] Lash and Koplan, Jour. Amer. Med. Assoc., 1926, 86, 1197.
[2] Dochez, Jour. Amer. Med. Assoc., 1924, 82, 542.
[3] Rosenow, Jour. Infect. Dis., 1925, 36, 525.
[4] Duval and Hibbard, Jour. Exper. Med., 1926, 44, 567.
[5] Duval and Hibbard, Jour. Exper. Med., 1927, 46, 370.

within the bacterial cell, or a new substance formed through chemical changes taking place concurrent with the disintegration of the cell. However, the experimental evidence is conclusive that it is the product resulting from the specific action upon the bacterial cell by a host-lysin. To what extent, if any, the lysin enters into the toxic product is not determined.

Scarlatinal Toxemia.—The toxemia of scarlet fever has been recognized for years by the physician as a factor of paramount importance. In a general way it is held responsible for the multiplex pathology of the disease. Even today, with the etiology of scarlet fever definitely known, there is much that is not clear concerning the toxemia.

There is considerable experimental evidence to show that the toxemia is caused by the endotoxic product of the streptococcus, and that there is no soluble toxin extant at any time to account for the condition. Presumably, in scarlet fever there are two toxemic periods during the course of the disease, the one following in natural sequence upon the other. Both are endotoxic in character though different in the manner of their production, and in their action upon the tissues, and their behavior toward specific immune substance.

In order to explain these toxemic states it is permissible to consider several stages of scarlet fever. The early toxemia occurs in the first stage and is due to the action upon the tissues of the whole protein of the specific streptococcus, and, as a result, the host is stimulated to produce a bacteriolysin. This lysin in turn exerts a cleavage action upon the living streptococcal cell and in consequence it is destroyed, and there is liberated an endotoxic product. At this stage of the infection the patient again becomes toxic from the newly formed lysin-split endotoxin. Thus, there is produced a second toxemic state. During this second toxemia, and as a result of the endotoxin, the rash, nephritis, and myocarditis, among other so-called late lesions, are developed.

Theoretically, there is no specific host-neutralizing substance present during the early formative period of endotoxin, which explains why the toxemia is severest at this stage of the disease.

In the course of the second toxemia anti-endotoxin is produced, which neutralizes the endotoxin and ultimately establishes an immunity. If we accept the endotoxic view, we have a reasonable explanation of the toxemias and a better understanding of the kaleidoscopic pathology of scarlet fever.

Scarlatinal Immunity.—The relative ineffectiveness of immune serum in the treatment of streptococcal infections, as compared with the efficiency of antitoxic serum produced with soluble toxins, has long been recognized. While antistreptococcal serum is effective in the treatment of scarlet fever, and, as it would seem, to a far greater extent than immune sera for other streptococcal infections, it is not comparable in toxin-neutralizing power to antidiphtheritic and antitetanic serums.

Experiments by the author show that a more potent serum for scarlet fever and other streptococcal infections should be produced with antigens that are essentially stimulators of neutralizing antibodies. Such antigens are the *in vivo* prepared streptococcal lysates which produce antitoxin in greater amount than is the case with living, killed culture or culture-filtrate.

A purely antitoxic serum is certainly desirable in the treatment of scarlet fever, because it will not increase the toxemia while, theoretically, a lytic serum will, owing to the simultaneous cleavage *in vivo* of the infecting streptococci, in consequence of which there is liberated quantities of endotoxin. We believe that the present antiscarlatinal serum which is in general use is more lytic than antitoxic; however, it is sufficient in neutralizing antibody to take care of the liberated endotoxin.

The fact, that neutralization of the toxic substance in scarlatinal culture-filtrate occurs with blood-serum of the animal immunized against this filtrate, does not necessarily imply that it is a soluble toxin, or that the neutralizing substance is a true antitoxin. An intracellular microbic poison (so-called endotoxin) will produce a specific neutralizing antibody, and because of its analogy to antitoxin we may call it anti-endotoxin.

The employment of the *in vivo* prepared toxic product of the scarlatinal streptococcus offers a better means of obtaining a more potent antitoxic serum than is obtained with the use of

either culture-filtrate (Dick's method), killed or living culture (Dochez's method). The active streptococcal principle, obtained by the method described by Duval and Hibbard,[1] and called by them "lysate," causes only the production of an antitoxic serum while the whole streptococcus give rise to the production of a lytic or bacteriocidal serum.

[1] Jour. Exper. Med., 1927, 56, 379.

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THE TREATMENT OF DIABETIC GANGRENE. PROPHYLAXIS. WHEN TO AMPUTATE. WHEN TO PRACTICE CONSERVATISM

THIS old bearded, widely smiling Russian Jew is not as old as he looks. He is really only fifty-four. As you observe, he is profoundly grateful to me. He considers that I saved his leg last year. He had a diabetic gangrene of his toes, and the surgeon was emphatic in his recommendation that the leg be amputated, at least below the knee, perhaps even above the knee. There was sound reason for the recommendation. The great toe was gangrenous—black—and there was apparent disturbance of the circulation of the other toes. The dorsum of the foot showed a few streaks of lymphangitis, and the impression of the first two days was that they showed a tendency to extend. There was no pulsation of the dorsal pedis and posterior tibial arteries. The *x*-ray showed a suggestive shadow of a calcareous blood-vessel in the middle third of the leg. It became apparent after a couple of days that the gangrenous process would be limited to the one toe and was quite superficial. It had become very dry. The lymphangitis was decidedly less. It was for these reasons, as we shall see later, that I ventured to persuade my surgical colleague to postpone the operation and to try conservative measures. In six weeks we were able to discharge the patient with his foot entirely healed, and without the loss of a single inch of tissue.

This second patient, age sixty-five, is also smiling and grateful. You notice, however, that he has lost one leg. He is grateful because we had the leg removed, for this procedure made life again worth living. It had been a constant torture for many

months previously. About a year before he came to us in February, 1925, he began to have cramp-like pains in his legs. His doctor recognized he had diabetes and prescribed a diet of "little meat, little starches, no pastries." In fact, the patient had been told in 1911 that he had diabetes. At that time he weighed 220 pounds, as contrasted with 185 pounds in 1925. Well, about a month before his admission to Touro Infirmary he noticed sores on his toes and feet, for which he had treatment from a chiropodist who used solutions upon them. Recently, the left foot had pained him greatly; in fact, so much as to interfere with his sleep. On the left foot below the ankle the skin was cyanotic, more particularly the external half, involving also the whole of the little and the great toe to the metatarsophalangeal joint. The other three toes were markedly less cyanotic. Midway on the dorsum of the foot in the line of the little toe was an ulcer about 2 cm. in diameter, covered with a crust. There was a smaller ulcer about 1 cm. in diameter on the dorsum in the line of the tendons of the great toe. The dorsalis pedis pulse could not be felt on the left foot, but was well felt on the right foot. We kept him in the hospital a month under conservative treatment. The ulcers grew smaller and the foot improved considerably. His general condition was much better. He was then allowed to go home to continue the treatment. For a while the improvement continued. He returned in December, 1925, however, because for two months the pain in the foot had become so severe that he realized that more radical measures must be taken. You see how long a dry gangrene may exist. This man kept his gangrenous foot from January to December. The *x*-ray picture showed shadows of the anterior and posterior tibial and dorsalis pedis arteries. They were like pipe stems. How futile had been our attempt to save this limb. How much unnecessary suffering might have been spared! The amputation was done 4 inches below the knee. At the operation the vessels were all found to have thick walls with calcareous deposits in them. The convalescence was uneventful. The patient has been relieved of what was formerly a nightmare of pain. He had been restored to comfort, and to a certain degree of activity and usefulness.

Another patient was not so wise as this man. He was one of my first patients more than twenty-five years ago, and I had followed the course of his mild diabetes all these years to the time of his death, at the age of seventy, in September, 1926. For several years he had noted a callus on the bottom of one of his feet. This was duly recognized as merely a disguise and covering of a perforating ulcer. It made walking difficult and painful. The patient was a very careful man, most punctilious about the hygiene of his feet so that, in spite of final involvement of the bony structures, he escaped infection until about ten months before his end. Infection brought gangrene in its train. There was pain and constant daily, almost hourly need for surgical dressing, as well as repeated removal of sloughing tissue and necrotic bone. This was not all. The grade of diabetes became more severe. The patient grew weaker as well as emaciated. In spite of all this both he and his family persisted in refusing amputation, preferring death with the limb than life without it.

If, in the case of the first patient, I seem to have been justified in dissuading the surgeon from operation, I was certainly wrong in urging amputation in the case of this woman of fifty-eight. She had known she was diabetic for ten years when in the summer of 1925 she had what she thought was an insect bite on the left leg. The "bite" became infected and, after nine weeks of going from bad to worse, she was admitted to the Touro Infirmary. The left foot and leg were then swollen to the upper third of the leg. On the anterior aspect of the leg there was a large, reddish-purple area extending from the instep about 6 or 7 inches up the leg and around each side. The skin surrounding this area and on the dorsum of the foot was dark purple. About the center of this reddish-purple area, there was a small hole where the skin had sloughed away. Pus drained slowly from this opening. There was fluctuation over the dorsum of the foot and up the front of the leg. It looked to me like a total loss. The surgeon, however, was more conservative than I and continued so even when gangrene of the skin of the dorsum of the foot set in. He had made incisions to establish proper drainage, and sloughs were subsequently trimmed away. In a few days the surgeon

was able to express the opinion that although the healing would be slow, the leg would survive if the patient did. Thanks to his conservatism, his assiduous attention, and thanks to insulin, she has, as you see, not only survived, but retained her leg.

This other lady, now sixty-four years, I present to illustrate another point as to the urgent need of conservatism at times. In 1920, she had consulted her family physician because of sudden darting pains in the feet and legs and hands. Sugar was discovered in her urine at that time. Despite other symptoms she did not really diet until a few months before she came to us in October, 1923. She had begun also at that time to use insulin, but both diet and insulin were inadequately gauged. She did not altogether heed the warnings we added to those already given her and disappeared from view until January, 1924. She then developed on the toes of both feet a fairly extensive, but superficial gangrene with blisters. Here conservatism was forced upon us. The two feet were equally bad. The patient was in poor general condition. She had a nephritis in addition to the diabetes. A double amputation was not to be considered. Here again we were gratified to find that conservative measures plus insulin were successful in saving both limbs without the loss of a single inch of tissue.

Similar considerations prevailed in another case, that of an old lady of seventy-three. In April, 1923 she was admitted to Touro Infirmary with an extensive gangrene of the left foot, with a lymphangitis ascending up the leg. Although she had had many typical symptoms for a long time, the glycosuria had been discovered only the day of her admission. Six weeks before, she had gone to a chiropodist who told her he thought she had diabetes and advised her to go to a doctor. She would not do this, however, until she had severe pains and the foot was turning black. This time both surgeon and physician agreed that amputation must be done to save life. The operation, amputation at the lower third of thigh, was done under gas and ether anesthesia. The first twenty-four hours after the operation were stormy, but thereafter the convalescence was smooth and the wound healed perfectly. Upon her return to her house the diet

and insulin were continued and she had excellent care. In January, 1924 she, nevertheless, developed a superficial gangrene of the toes of the remaining foot. A second amputation in so old and frail a patient was fraught with grave danger and was not to be considered except as an urgent life saving necessity. The time element did not have to be considered at all. The old lady lived a bed and wheel-chair existence anyway and it mattered not at all how long it would take to heal the toes, provided in the course of the healing her life was not endangered. It took three full months to bring about the healing but in the end she did not lose the smallest part of the smallest toe.

We have had several other patients who, having lost one leg by gangrene, have been so heedless and careless as to permit a subsequent gangrene, beginning in the toes of the remaining foot, to extend to such a degree as to leave no alternative but amputation when they finally presented themselves. Such a patient was a night watchman, age fifty-nine, at the time of his first admission in 1924. For five years he had noticed numbness and coldness in the right foot, at times giving rise to great discomfort. Two months prior to his admission he began to have severe pain in the left foot, very much like the pain and numbness previously in the right foot. He found on removing his shoe that his left foot was red and there was a blister around the great toe. The great toe became black, and the foot was swollen and painful. When he came, the gangrene was deep and infected and there was an ascending lymphangitis. The dorsalis pedis and posterior tibial pulsation could not be found. Amputation was done at the middle third of the leg under ethylene-gas anesthesia. The wound healed by primary union. In June, 1925—about a year after his discharge—he returned because he had noticed since a week a small blister on his third toe. The foot was dusky from the tip of the toes to just above the ankle and the surface of this area was somewhat warmer than that of the leg higher up. The toe nails were thickened, black (dirty). On the plantar surface of the great toes there was an area about $\frac{1}{2}$ cm. in diameter, covered with callus with a suggestion of a previously existing superficial ulcer. On the plantar surface of the third toe there

was an area about 1 cm. in diameter, shiny and smooth, giving the impression that there had been a blister here recently. The epithelium had entirely desquamated. Neither dorsalis pedis nor posterior tibial pulsation could be felt. The patient had taken the insulin for only three weeks after his first discharge, and had abandoned all dietary restrictions. On this second admission, cleansing of the foot, Buerger's exercises (presently to be described), exposure to electric light, diet, and insulin brought about a revolution in the appearance of the foot. Again the patient was thoroughly instructed and again he was warned of the dangers of neglect. All in vain. He presented himself a third time in 1927 with a foul-stinking gangrene of the foot. He had never observed any care of the foot. He had immediately abandoned the insulin and discarded the diet. Poor fellow, it was all a combination of poverty and ignorance. To cap the climax he had applied kerosene and subsequently a sticky, black salve to the gangrenous areas. Infection had, of course, taken place, and lymphangitis was extending up the leg. Amputation was imperative as a possible life-saving measure. It was done in vain. Subsequent to the operation—amputation 3 inches above the knee under spinal analgesia—the patient was restless and uncontrollable, and died of exhaustion after sixty-six hours.

These patients have been shown you and these histories have been related, each to illustrate a point. First of all we have had recurring in all these cases the outstanding fact that, to a large extent at least, these gangrenes might have been avoided. Neglect of the hygiene of the feet of diabetics has caused the sacrifice of many limbs and the loss of many lives. Joslin[1] has said that any diabetic fifty years of age had better bathe his feet as carefully as his face, if he wishes to avoid gangrene. Tight shoes that bind, loose shoes that rub must be avoided. The socks or stockings and the linings of the shoes must present no unevenness to cause breaks in the skin. It is striking that the Japanese who care assiduously for their feet, and who wear thick socks and sandals which do not compress the feet, are said to have little or no gangrene, while the negroes who are careless and who wear poor, ill-fitting socks, and shoes full of unevenness and

of holes are frequent victims of gangrene. Prophylactic care of the circulation of the feet would probably have saved not only his life, but both his legs, had the night watchman, whose case I have related, heeded the long repeated warning signals of pain and numbness. Patients often suffer the pains of intermittent claudication which are erroneously interpreted as due to "neuritis," "arthritis," or "flat-foot." These patients must be impressed with the importance of avoiding garters and the like which interfere with the circulation. They must be taught not to assume such positions as prolonged sitting, in which pressure is made upon the vessels. They must be made to appreciate the meaning of numbness and the pains, and to understand, therefore, that they must not persist in walking or in standing when these pains come on. Perhaps the very nature of his perambulating job contributed in large measure to the downfall of the night watchman. Buerger's vascular gymnastics have served us well in improving the circulation in those cases with superficial gangrene which we have treated conservatively with so much satisfaction. These exercises might and should be employed prophylactically in patients who, as our patient initially did, present only the phenomena of numbness and pain. It would seem unnecessary at this day to warn against careless trimming of corns and bunions in diabetics. The profession, perhaps, does not need the warning; in fact, too many doctors still regard diabetics a surgical *noli me tangere*, and carry their fear of any trauma in the presence of diabetes much too far, now that we have insulin. The patients, however, need the warning and do not receive it often enough from their physicians. Their warning must extend to cover not only trauma from knife or scissors, but also that produced by the application of corn cures. At the Touro Infirmary we have a small series of gangrene cases, brought on in diabetics by the use of a widely advertised corn eradicator. Still another point in prophylaxis lies in the recognition by the doctor of the significance of many of the calluses. They are frequently the sentinels of underlying sinuses of perforating trophic ulcers. Certainly their true nature may be more than suspected when these calluses seem to be infected,

or when from under one edge there exudes a thin, serum-like material. When these calluses are recognized as disguising trophic ulcers, there will be no promiscuous trimming, but rather greater care of them. The chance taken of infecting them will be less, hence, the probability less of gangrene supervening upon the infection. Beneath these trophic ulcers often lies serious and extensive bone destruction; recognition of the true nature of the process will carry with it the application of the proper surgical treatment.

In the presence of gangrene, already established, there is need of the closest co-operation between physician and surgeon. It is certainly unfair to the latter that he should be called in when the issue is almost necessarily fatal. When extensive and advancing infection has taken place, when even septicemia is already present, we ought not to expect rescue at the hands of the surgeon in a large percentage of the cases. After all, the treatment of gangrene is chiefly surgical, and the final decision as to the mode of treatment should rest with the surgeon; his advice and help, therefore, should be sought early, not late. Conservative treatment—the use of electric light, desiccating methods, trimming of dead tissue—all of this, not the amputation alone, is surgical. The physician can contribute his opinion of the general condition of the patient, of the latter's ability to withstand more or less serious operations and the dangers of the anesthetic; he can contribute the proper preparation of the patient for operation and for postoperative treatment by intelligent handling of the diet and of the insulin. I believe he can also contribute something from his experience gained in the observation of some of the conservatively handled cases. Certain indications for amputation are undoubted:

1. Extensive and deep gangrene.
2. Moist gangrene.
3. Advancing lymphangitis.
4. Pain (unbearable and persistent).

There are, however, many cases where these indications are not present, or where their extent is open to debate and discussion. Joslin[1] and his co-workers are inclined to urge the uselessness of

attempting to save most gangrenous legs and point to the study of specimens removed at operation as showing how hopeless it is to expect the arteries to regain their function. This was the reason the surgeon urged amputation in the first case related here. The gangrene, however, was dry, uninfected, and the process localized. The limb was saved even though there was no dorsalis pedis pulsation and in spite of the fact that the skiagram showed calcification of the vessel in the middle of the leg. On the whole, I am inclined to agree with Labbe's[2] plea for an expectant plan of treatment where the gangrene is dry and not infected. He says: "I have seen the majority of arterial gangrene get well by medical treatment, which consists simply of letting nature accomplish its work of mummification and elimination. The final results are not perfect. Sometimes deformities are left which interfere with the function of the limb. But it has the great advantage of limiting the loss; where the surgeon would have taken off at least the foot, the patients gets away with only the loss of one or more toes, preserving a foot good enough to walk upon." It should be conceded, however, that a deformed foot interfering with the function of the leg is worse than no foot at all, and if this seems the probable outlook, amputation should be acceded to. This was really the plight of my old patient who insisted on going to his grave with his leg. Even had it been possible to save his life and his limb, the latter would have been useless to him because of the deformity resulting from the extensive bone destruction. It must, furthermore, be conceded that the expectant plan is time consuming as contrasted with the rapid recovery from a successful, clean amputation. The economic status of the patient must, therefore, enter in as a consideration. Granted, however, that the patient, because of even relative financial security, can contemplate an invalidism of weeks or even several months with equanimity, granted that the gangrene is dry, relatively superficial and the condition of the patient is good, it has been my experience that the expectant plan is well worth while. This consists of keeping the part clean and dry. Such handling as must be done is carried out with precautions of asepsis. An ordinary electric light is suspended

about 18 inches above the affected part. The effect of the light and heat is not only to promote the desiccating process but also to improve the circulation. In combination with this I have made constant and gratifying use of Buerger's vascular gymnastics.[3] The procedure is as follows: "The affected limb is elevated with the patient lying in bed, to from 60 or 90 degrees above the horizontal, being allowed to rest upon a support for from thirty seconds to three minutes, the period of time being the minimum amount of time necessary to produce blanching or ischemia. As soon as blanching is established the patient allows the foot to hang down over the edge of the bed for from two to five minutes, until reactionary hyperemia or rubor sets in, the total period of time being about one minute longer than that necessary to establish a good red color. The limb is then placed in the horizontal position for about three to five minutes, during which time an electric heating pad or a hot-water bag is applied, care being taken to prevent the occurrence of a burn. The placing of the limb in these three successive positions constitutes a cycle, the duration of which is usually from six to ten minutes. These cycles are repeated over a period of about one hour, some 6 to 7 cycles constituting a seance. The number of seances cannot be categorically stated, but should vary with the case. In a general way they should occupy at least six to seven hours a day, that is every alternate hour during the daytime. During the hours of rest, heat is applied continuously in the form of an electric pad, hot water-bag, hot-air apparatus, or electric lamp."

The general management of the diabetes by diet and insulin is practically that of an uncomplicated case. It has not been my observation that insulin by reason of lowering the blood-sugar will improve the local condition. One should not be deceived into believing that a doomed limb will be saved by insulin. What insulin does is to make the patient temporarily quasi non-diabetic, and to convert the problem before us into one where we have to consider only the vascular occlusion. The indications for amputation remain the same whether insulin be used or not. The advantage of the insulin lies in the improvement of the general condition of the patient, and in raising his powers of resistance

and of recuperation. These advantages are all the greater when operation has to be decided upon. As Blotner and Fitz[4] have well said: "In comparing cases of diabetic gangrene treated surgically with and without insulin, it appears that insulin has afforded a means for rapidly desugarizing patients before operation, and for allowing them a liberal diet during the period of convalescence from operation. Before the days of insulin we saw certain patients who died in coma; certain others were forced to undergo prolonged periods of malnutrition in preparation for operation and during convalescence therefrom, and suffered progressive loss of weight and strength, became unresistant to infection, finally required repeated operations, and even died after a protracted illness. With insulin we see patients made free of acidosis and prepared for operation in a few hours and able to eat an adequate diet shortly after operation, as a result of which they gain weight and strength, resist infection, and recover from their illness in a rapid and gratifying fashion. The hospital's death-rate from diabetic gangrene is considerably higher than the present death-rate from diabetic coma. The proper use of insulin in the treatment of diabetic gangrene is as important as is the proper use of insulin in the treatment of diabetic coma. All cases of diabetic gangrene should be treated as carefully and as energetically as cases of diabetic coma are treated." Finally the physician joins the surgeon in co-operating to prepare the patient for operation—a diet providing 80 to 100 grams of carbohydrates easily assimilable, as, for example, orange juice, cereals, crackers and milk, with insulin adequate to keep the urine free of sugar, is highly desirable for several days before the operation as a proper preparation. Often, however, in neglected cases presenting themselves at the eleventh hour such preparation is impossible. An extra meal of 20 grams of carbohydrate within six hours of the operation, buffered by an extra dose of insulin, has become routine practice here. When a general anesthetic is employed, we give on the operating table glucose intravenously (20 c.c. of 50 per cent. solution) to forestall the postoperative period of starvation and possible nausea. This glucose is buffered by insulin hypodermically. Thus the patient prac-

tically loses not a single meal. It has been my experience that ethylene gas anesthesia, plus the glucose intravenously, plus the insulin permit the gravest operation to be done without danger of acidosis. The CO_2 combining power of the blood-plasma has been estimated before and after such procedures and has been found as high after as before the anesthetic. In a few cases in my series the amputation has been done under spinal analgesia. Here there has been no interruption in the diet and insulin routine established before the operation.

BIBLIOGRAPHY

1. Joslin, E. P.: Treatment of Diabetes Mellitus, 3d ed., Lea & Febiger, 1923.
2. Labbe, M.: Presse méd., 1925, 33, 281.
3. Buerger, Leo: The Circulatory Disturbances of the Extremities, W. B. Saunders Co., 1924, p. 380.
4. Blotner, Harry, and Fitz, Reginald: On Diabetic Gangrene, with Particular Reference to the Value of Insulin in Its Treatment, Boston Med. and Surg. Jour., 1924, 194, 1155.

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PLEURISY

Diagnosis and Treatment of the Plastic Stage.—Pleurisy, like the poor, we have with us always, and it presents such infinite variety that there is always room for some additional discussion. It commands our interest, both as a distressing complication of other disease processes, and as a primary condition itself.

There has been a tendency to regard the plastic, serous, and purulent types as separate diseases; I believe we can best grasp this subject by considering these three as merely different stages of the same process. It probably always begins as a dry (plastic) pleuritis, though this stage may be so slight, or so transient as to be overlooked. In a fairly large percentage of cases the disease does not reach the second stage (serous pleurisy, or pleurisy with effusion). The third stage (purulent pleurisy, or empyema) is fortunately comparatively rare, except where the pleural involvement is a part of pneumonia.

We will discuss here only the first stage of so-called acute primary pleurisy.

The only absolute diagnostic finding is the friction rub, though a comparatively definite diagnosis may be made by the presence of one or more of other evidences. This friction rub is found most often about the anterior axillary line. It may be transient in character, it may be heard only at the end of a forced respiratory effort, and often is quite difficult to detect.

Next in importance from a diagnostic standpoint is a thoracic pain that is respiratory in character. In many cases this is present without an audible friction rub developing. It may be

said in a general way, that any chest pain that is relieved by suspending respiratory motion and develops upon the patient's breathing is probably pleuritic in origin. A diagnostic maneuver of some value here is to grasp the affected side of the lower thorax between the two hands, placing one to the front and one to the back, but so arranged that the thumbs interlock; and then to make gentle pressure while the patient takes a breath of just sufficient depth as would cause the pain when the pressure is not made. By alternately making pressure and releasing during the respiratory cycles, the patient can judge as to whether or not relief is obtained by this mild fixation. If relief is thus obtained, the cause of the pain is probably due to pleural involvement. There is usually a disinclination on the part of the patient to lie on the affected side, as that degree of pressure increases the discomfort.

When the lower costal or the diaphragmatic pleura is involved, pain is also often referred to other areas. The lower costal region and the outer portion of the diaphragm is supplied by the five or six lower intercostal nerves, and an involvement in these areas may give rise to pain, tenderness, and muscular rigidity in the abdomen, where these nerves are further distributed. The central portion of the diaphragm is supplied by the phrenic nerves, and involvement here may be referred to the areas of distribution of the nerves that are related to the phrenic in the cervical plexus. This gives rise to discomfort in the region of the scapula, the clavicle, or the upper part of the shoulder. It is sometimes the case that the inflammatory process is so extensive as to occasion pain not only in the region affected, but referred pain in one or both of the related areas just mentioned.

More or less fever is practically always present, though it is not often as high as in pneumonia. This is a finding of some value in differential diagnosis. There is practically always an increase in the pulse rate which is probably more pronounced when the involvement is of the left side. Respiration is rapid and shallow. The patient makes effort to carry through the respiratory cycle without taking it to sufficient depth to produce friction of the two surfaces that are, to a certain extent, held together by the

plastic exudate. This may give rise also to a jerky type of speech, the sufferer using short sentences, and sometimes only one or two syllables before the taking of each shallow breath.

Upon inspection, the patient usually looks sick. The expression is one of pain and anxiety. Observation of the chest may show impaired respiratory movement of the side affected.

Palpation of the area involved may reveal the friction rub. Any type of bilateral palpation may also disclose the fact that there is relatively impaired movement of one side. This unilateral impairment develops quite early and is due to muscular

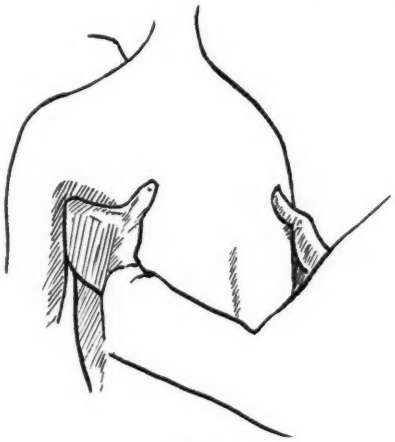


Fig. 79.

fixation, just as occurs on the right side of the abdomen in acute appendicitis. I have found that I can best determine this by the following plan:

The patient is placed in a sitting or standing position: The examiner stands or sits back of the patient and places his hands so that the fingers reach up into the axillæ, the tips resting upon the tops of the highest conveniently reached ribs, usually the second or third. The thumbs and palms are so applied as to fix the examiner's hands so that, when the patient breathes, the ribs move under the finger tips. With each inhalation there is a

lifting up and rotation of the ribs, and normally this is of such extent that a whole rib on each side glides under the finger tips, which drop into the next lower intercostal space, to return to their original position during exhalation. When there is unilateral impairment of movement, it can be judged with considerable accuracy by the relative excursion of the ribs on the corresponding sides during the respiratory cycle (Fig. 79).

Percussion may reveal tenderness and some type of impaired note.

Upon auscultation the friction rub may be heard, and there may be a relative impairment of respiratory and voice sounds. One finding here that is sometimes not sufficiently stressed is that with an ordinary pleurisy there may be at first sufficient congestion of the underlying lung to very closely simulate a pneumonic process.

Treatment.—There is no specific treatment, and the management of the case resolves itself into the employment of measures toward fixation of the side affected; the various matters of general care, including proper diet; the relief of symptoms, and the management of convalescence.

Unfortunately, the tendency is for us to regard strapping as the sum total of possible effort in the matter of fixation. It should be remembered that everything that tends to lessen the respiratory movement contributes to that extent toward an immobilization of the thorax. We must, therefore, avail ourselves of absolute mental and physical rest. Body movements, talking, mental excitement, or any form of stress increases the respiratory movements. They give rise also to coughing, restlessness and insomnia, and, therefore, both directly and indirectly increase the damage and discomfort.

The treatment quarters should be selected with a view to isolation not only from visitors and members of the household, but from noises, odors, or any other disturbing factors. A comfortable bed and the proper amount of covering naturally contribute to rest and sleep. A sufficient supply of fresh air is absolutely necessary—it naturally obtains that the better the air the less respiratory movement is necessary to carry on the pulmonary

function. Uncomfortable drafts should be avoided. Oil stoves or gas heaters should under no circumstances be permitted. In cold weather an open fireplace not only tends to warm the room, but increases the ventilation, and is, therefore, highly desirable.

A factor, here of considerable importance, is interference with the function of the diaphragm by gastric or intestinal distention. This will be discussed in detail under the heads of diet and elimination.

Relief of pain and the induction of sleep are of much importance from the standpoint under discussion. These will be discussed later.

The mainstay of treatment is strapping the affected side with adhesive plaster. This is of benefit both for the relief of pain and as a curative measure. By preventing the inflamed surfaces from rubbing together pain is avoided, but a consideration that is often overlooked is that the holding of these damaged surfaces together lessens the tendency to an extension of the inflammatory process by trauma, favors the formation of adhesions and gives opportunity for repair, therefore being directly curative in effect.

In deciding when to strap, several factors must be taken into consideration. If a friction rub cannot be heard, the pain is not intense, and there is any doubt as to the diagnosis, we may be justified in temporizing until a diagnosis can be established, as the presence of adhesive plaster practically excludes any satisfactory diagnostic work, and to remove and re-apply tends to damage the skin, as will be discussed later. Not only is auscultation through adhesive unsatisfactory, but compression of one lung does away with the value of other comparative findings of the two sides of the chest. Under no circumstances should any application be used that may cause irritation of the skin, as this will interfere with the use of adhesive later.

There are many varieties of adhesive plaster and satisfactory results often depend upon the selection of good material. I prefer the 2-inch wide rolls of zinc oxid adhesive. Any brand will deteriorate rapidly under unfavorable conditions, such as

excessive moisture or hot weather. The material to be used should always be tested out before beginning the process of strapping. If the physician himself takes the adhesive to the home of the patient, he should test it before starting out as this may save considerable inconvenience. This may be done by unrolling about an inch of the strip and then determining the degree of its adhesiveness by applying the thumb to its surface. If the plaster is much damaged some discoloration may show through the back of the material. It might be mentioned here, that after the sticky side once comes in contact with the skin and then is removed it will never adhere satisfactorily again, so should be discarded.

Another little measure that contributes to satisfactory work is that of cutting the strips before beginning the strapping. I have never been able to apply adhesive satisfactorily by unrolling the spool as I apply it. My plan is to unroll a sufficient length, depending upon the size of the individual, apply the back of the plaster to the patient's body and measure the length of the strip that I wish to use; this is then cut, attached to some convenient object, such as the back of a chair, and the desired number of strips measured and cut by this. This facilitates rapid and satisfactory work, once the process is begun.

Another preliminary step is the preparation of the chest. In many instances various measures have been resorted to, such as the use of oily liniments and salves. These, of course, should be carefully removed. In fact, it is best always to wash carefully the area to be strapped with soap and warm water, dry without friction, and sponge lightly with ether. The ether must be allowed to evaporate thoroughly before strapping is begun. If there is any hair that comes within the field of operation this should be carefully shaved. I say carefully shaved, because it is particularly undesirable to damage the surface of the skin. Any irritation, as from a dull razor, may tend to increase markedly the discomfort and reduce the effectiveness of the measure being carried out. If the strapping is to be carried up high and there is axillary hair that might be caught under the plaster, it should be clipped sufficiently to remove it as a source of possible trouble.

There are few things more uncomfortable than for this axillary hair to be caught, so that when the arm is raised the patient experiences a sharp twinge of pain. This may particularly interfere with sleep.

If previous efforts at treatment have caused an area of damaged skin, this may be treated as discussed later under special considerations.

The position during the process of strapping often must depend upon the condition of the patient. Where possible, it is most satisfactory to have the individual standing or sitting upright. If in bed the feet of the patient should be outside as otherwise the body will be humped over, and it is, of course, necessary to have the body line, when strapping is done, the same as will be maintained later. Whether the patient is sitting or standing, the arm on the affected side is best held straight out at right angles to the body. The patient may grasp some object, or the arm may be held by an assistant. Under no circumstances should it be raised to the head, or carried across to the opposite shoulder, as these positions change the relation of the structures in the area affected so that, when the arm comes back to a normal position, it will be found that the plaster does not fit smoothly and comfortably. If the patient is unable to sit up, it is best to have him lie on his back. For each strip the body is slightly turned, just enough to allow the hand of the physician to place the end of a strip about the median line of the back, the patient then returns to the dorsal position and the strip is carried around to the front.

I have often spent more time in teaching the patient to cooperate than I have in the actual strapping process. It is naturally desirable to apply the adhesive at the end of a forced exhalation, as this is the only way that any appreciable amount of fixation can be secured. A forced exhalation may cause considerable discomfort, and my rule is to carefully work with the patient until I have taught him to exhale and then wait. I do this the last thing before beginning the actual application of the strapping, as the patient may otherwise forget.

Some writers tell us to begin in front with each strip and

carry it around to the back; others tell us to begin at the back and carry around to the front. I have found it better to hold one end of the adhesive in my right hand and one in my left. I then apply first the end held in my left hand, and let the patient exhale and wait, as I forcibly carry the right hand around the body until the strip is in place. This naturally requires that, if I am strapping the right side of the patient, I begin at the back and carry the strip around toward the front. If I am strapping the left side, I begin at the front and carry the strip around toward the back.

The strips are always applied from below upward. Using a 2-inch wide adhesive, I overlap each strip about 1 inch, being guided, of course, to a certain extent, by the circumstances that prevail in the particular case.

I begin each application at the median line or just beyond it, and carry the strip around to half the circumference of the chest or a little more. If half the circumference of the chest is covered by the regular strips when applied, the additional vertical one, that is used to fix the ends of the others, naturally carries the area covered a little beyond the median line, front and back.

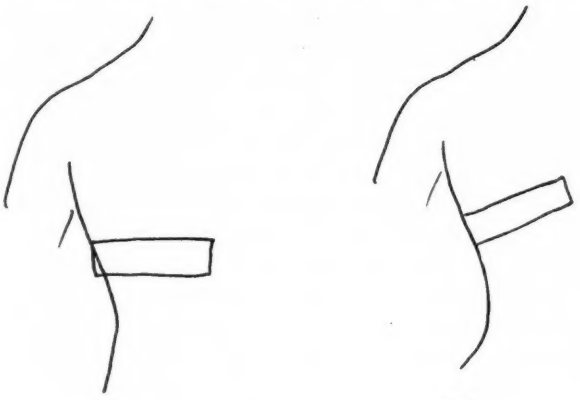
It is probable, that in most cases all possible benefit is obtained by about three strips applied to the lower costal region. It is unquestionably the case, however, that instances are found in which better results are obtained by carrying the strapping higher.

There is a tendency on the part of many to apply adhesive parallel to the surface of the earth, irrespective of the contour of the body to which it is applied. As medical students we were taught in minor surgery to "follow the bandage," and this was with bandages that had a certain amount of elasticity, while adhesive has practically none. It is highly desirable that the material fit the body snugly and present an unwrinkled surface. Too much emphasis cannot be laid upon this matter. This is illustrated in Figs. 80, 81.

No matter how carefully the strips are cut, there is some unevenness of the ends when all have been applied. These not only mar the appearance of the finished work, but tend to pull or

come loose. Fixing the ends by a vertical strip, front and back, has many advantages and no contraindications (Fig. 82).

There are certain special considerations that may be discussed here. One of these is the care of an area of injured skin.



Wrong. Right.

Figs. 80, 81.

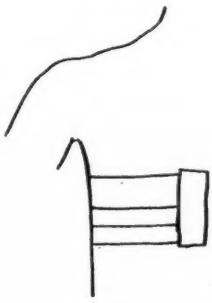


Fig. 82.

Very often these are present as a result of blisters, poultices, hot-water bottles, and other efforts at local treatment. If the adhesive is applied over such a spot, it may give rise to marked discomfort and even considerable damage. A safe plan is to treat the lesion by cleansing, and any application that may be

indicated by the extent of the damage found. The area is then covered with a piece of sterile gauze of such size and shape that the lower end will project below the lower margin of the adhesive plaster, thus permitting drainage should such be necessary (Fig. 83).

In strapping the chest of women, about three 2-inch strips applied to the lower costal region usually meet all requirements. Where further fixation is necessary, the following plan will be found very satisfactory. Beginning at the lower costal margin

Fig. 83.

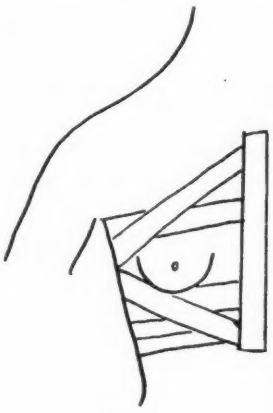


Fig. 84.

the strips are applied until the mammary gland is reached; one or two strips are then applied above the mammary gland. The number of these depends upon the anatomic development of the particular individual. A strip is then begun above in front, and carried obliquely downward and backward, ending at the lower margin of strapping at the median line of the back. Another strip is begun above in the back, and carried obliquely downward and forward to the median line in front. These cross in the midaxillary line (Fig. 84).

When it is desired to remove adhesive, there are many factors that must be considered. Among these might be mentioned the following:

The adhesive should be removed any time that it is deemed necessary to make an examination of the side of the chest involved. This will be discussed to a greater extent in a succeeding paragraph.

When the pain has ceased, and we have reason to believe that the inflammatory process has subsided, when adhesions have taken place, or fluid developed, the plaster no longer serves a useful purpose and should be removed. Should the pain return, it may be re-applied.

Sometimes there may be sufficient discomfort from damage to the skin to counteract whatever amount of good the plaster may be doing, and we have all had the experience of having to remove the plaster before we would have thought of doing so under other conditions. I have known extensive blistering to take place on an apparently normal skin within twenty-four hours. Again I have known patients to wear adhesive for weeks, refusing to have it removed for fear of a return of pain, and yet show no skin damage.

There is sometimes a tendency on the part of the profession to sidestep the rather unpleasant task of removing adhesive, by instructing the patient or some member of the household to remove it. I believe that there is a certain amount of skill in this little service, and that the skin surface may be conserved to a certain extent by the proper manipulation. Probably the most uniformly satisfactory method is as follows:

One end of the strapping is lifted sufficiently to permit the whole row of strips to be firmly grasped by the right hand of the physician. The skin is then tightened, by the left hand being firmly applied and tension made, the adhesive is then removed by a succession of firm pulls, each lifting several linear inches. Each time the left hand is brought forward as far as the exposed skin will permit, and tension made for the next tug. Instead of the plaster being pulled out at right angles to the surface, it should be doubled back upon itself.

If it is thought that the skin damage is extensive, the plaster may be easily removed by sponging the back with ether, but this leaves a large part of the sticky substance on the skin of the pa-

tient. Where the patient removes the adhesive, prolonged soaking in hot water, while it does not loosen the plaster appreciably, may deaden sensation to the extent of enabling the patient or some friendly assistant to remove it with less discomfort. The psychic effect at least is good. When the plaster is removed in the ordinary way, there is only a small amount of the adhesive material left on the skin, and this may usually be removed immediately with ether. If there is much local irritation it is best to let this remain and merely dust over with talcum powder. At a later date it may be removed with ether or melted petrolatum. The reason for dusting with talcum is to prevent this material from sticking to the clothing of the patient, thereby causing discomfort and possibly damage to the garment.

At times it may be necessary to re-apply the strapping. If there is no skin damage or if it is slight, this may be done without hesitation. Sometimes it may be necessary to temporize until sufficient repairment of the surface has taken place.

There is something that I wish to emphasize particularly here, and that is the examination of the chest after removal of the adhesive. We are all inclined to palpate, percuss, and auscultate right after the removal of the strapping, to compare the findings on the two sides of the thorax, and make our deductions. This is obviously fraught with many possibilities of error. If the patient had an injured wrist and the hand had been kept in splints for several days, we would not remove the splints and immediately make a functional test of the two hands, and judge as to whether or not permanent injury had been done by the comparative disability of the impaired member. It likewise obtains that, when one side of the chest has been properly strapped at the end of a forced exhalation, the lung and muscles on that side are practically put into splints, while the other side takes on a compensatory hyperactivity. When the strapping is removed, it may be hours or days before a perfectly normal chest will return to the previous state of equal functioning of the two sides, and we must remember that our deductions are largely drawn by a comparison of these findings. My contention is, therefore, that hours, or even days, must elapse before full sig-

nificance can be given to any abnormal conditions that may be found.

Most of this little discussion has been given to the matter of strapping the chest, because, from the standpoint of treatment, this is our most important measure. There are some other factors, however, that must not be neglected:

The pain may be so severe as to require medication. The most satisfactory agent is codein, which may be given by mouth or needle, in the minimum amount that may be found necessary. Often the codein may be combined with acetylsalicylic acid, that is where the possibility of pneumonia can be excluded. This may be ordered in doses of $\frac{1}{4}$ grain of codein (0.015 gm.) and 5 grains (0.3 gm.) of acetylsalicylic acid every two to four hours until relieved. Rarely, a hypodermic of morphin may be necessary. I believe this should be avoided, if possible, for many reasons, the principal one of which is that it may interfere with intestinal elimination, thus lending itself to many unfavorable possibilities.

Elimination should be maintained without violent purgation. As previously stated, it is particularly undesirable to have abdominal distention that would interfere with the function of the diaphragm. A satisfactory plan is to give about $\frac{1}{2}$ fluidounce (15 c.c.) of liquid petrolatum each night at bed time, and about $\frac{1}{2}$ fluidounce (15 c.c.) of castor oil in the morning, if required. Enemas may be given, if necessary.

The diet should receive particular attention. The stormy febrile stage is usually short, and a high caloric intake is certainly not necessary in most cases. The ideal is rather to keep the individual comfortable, and to avoid the possibility of food becoming a disturbing factor. The actual diet list will have to depend to a large extent upon the condition of the patient, and the past history as to the digestive ability. As the condition of the patient improves, the diet should be increased as indicated.

In the matter of prognosis we should remember that these so-called primary cases are often the result of pulmonary tuberculosis. The statement is generally accepted that "pleurisy, particularly if with effusion, justifies the diagnosis of tuber-

culosis." It is best in these cases to have, at some favorable time, a frank discussion of the possibilities with the patient and those others most concerned. I do not believe that we are justified, in the type of pleurisy under discussion, in making an absolute diagnosis of pulmonary tuberculosis, but the individual should be given the facts as we have them and every precaution taken, both in the way of repeated examinations and a general system of living, which should be ordered very much as though pulmonary lesions had been found. After apparently complete recovery, a good rule is to make a thorough examination every three months for three years.

CLINIC OF DRS. RALPH HOPKINS AND O. E. DENNEY

U. S. MARINE HOSPITAL NO. 66

A PHOTOGRAPHIC DEMONSTRATION OF SOME OF THE MACULAR LESIONS OF LEPROSY

THE generally accepted classification of leprosy into two main types, and a third, the combination of these, is prone to

Fig. 85.—Small, depigmented macule on buttock of a baby; the first lesion detected in this patient. (Small scars from cured scabies are faintly visible.)

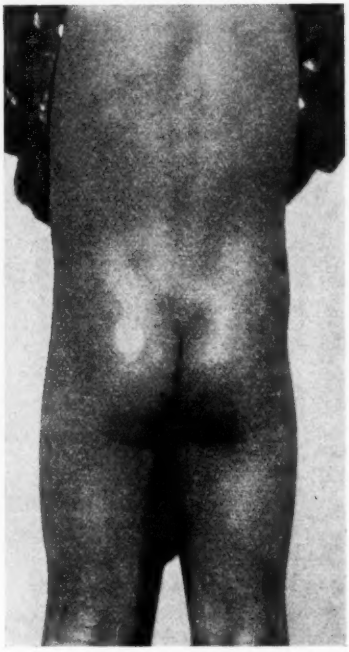


Fig. 86.—Larger, depigmented macule on buttock of a child.

lead one into error in attempting to segregate types. Rarely, in the course of the disease, a patient may present symptoms

indicative of either skin or nerve leprosy alone; usually, however, thorough examination, repeated as the disease progresses, will disclose symptoms of both types.

The "spots" of leprosy have been considered by many as indicative of nerve (anesthetic, or maculo-anesthetic) leprosy; the protean character of the "spots" however, precludes the

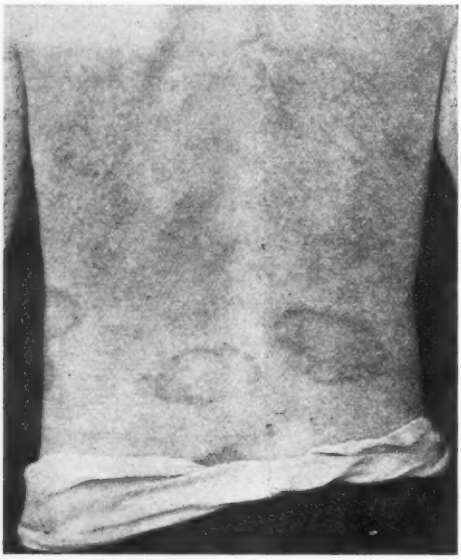


Fig. 87.—Discrete, circinate macules having atrophic centers and slightly erythematous borders.

finality of such classification; it is the purpose of this demonstration to indicate some of the interrelations.

An early and possibly primary lesion in some cases of leprosy is a small macule, frequently discovered on the buttock, back, or cheek. Such a lesion is erythematous, usually not raised above the surrounding tissue and may or may not disclose changes in sensation; lepra bacilli are demonstrated with difficulty or not at all. From such lesions (Figs. 85, 86) it is impossible to

accurately prognosticate the future progress of the disease, especially if the patient is a child or otherwise non-co-operative.

A not infrequently seen early "spot" of leprosy is the erythematous macule which spreads peripherally and is spreading loses its erythematous center, which may become depigmented or retain the normal skin pigment. Such "spots" (Fig. 87)

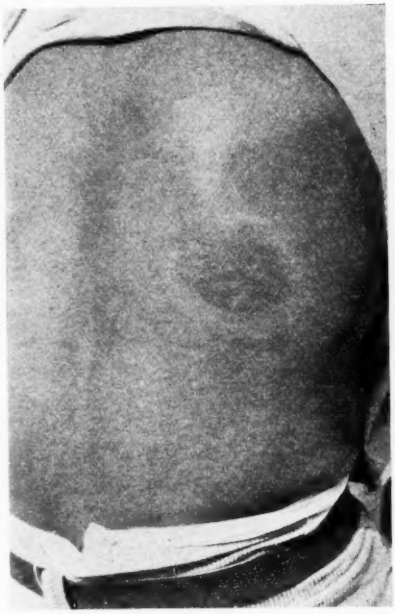


Fig. 88.—Elevated plaque, studded with small nodules, and surrounded by a depigmented zone.

are usually anesthetic and may, as the disease progresses, become somewhat centrally depressed. Usually a few acid-fast bacilli can be demonstrated from the erythematous margin. This type of lesion is the usual skin manifestation of the nerve type of leprosy. Rarely, nodules teeming with lepra bacilli appear in these lesions (Fig. 88).

Fig. 89.—Slightly erythematous, marginated macules, without central atrophy.

Fig. 90.—Small, discrete and confluent macules, grayish brown in color (Typical *café au lait* lesions).

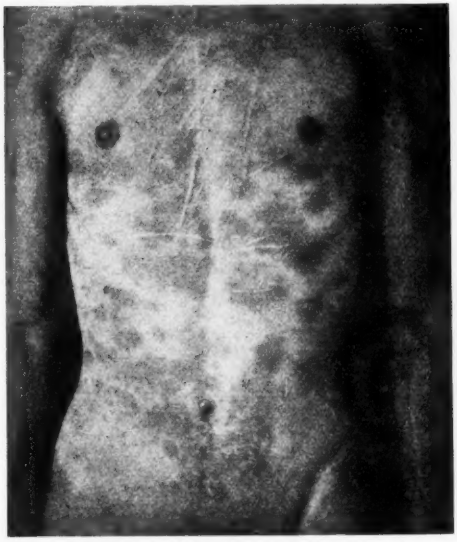


Fig. 91.—Large, confluent macules, faintly pink to gray in color (keloid-like linear cicatrices from trauma).

Fig. 92.—Large, elevated, highly inflammatory patches, distributed with almost perfect symmetry on arms and hands.

Fig. 93.—Confluent, overlapping, recurrent macules of various ages, studded with acute nodules.

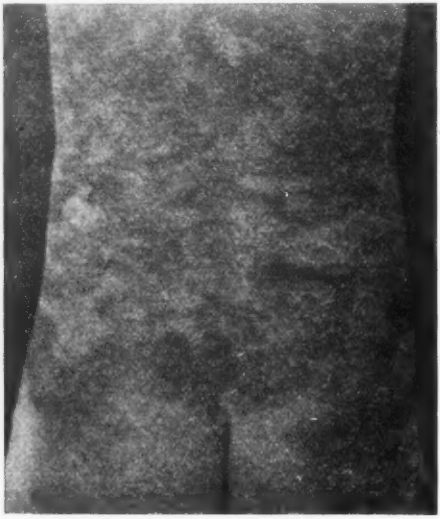


Fig. 94.—Grayish-brown, confluent macules after subsidence of acute symptoms. (Same patient as Fig. 93.)

Fig. 95.—Discrete and confluent nodular plaques.

Fig. 96.—Nodular, highly inflammatory tumor-masses, involving almost the entire body surface.

An early lesion, frequently the precursor of skin (nodular or tubercular) leprosy, is the solid, erythematous plaque, which, as the disease progresses, may fade into the classical *café au lait* (coffee with milk) appearance; this lesion (Figs. 89–92) is usually full of lepra bacilli; it persists for a long time and disappears as improvement occurs, leaving no stigmata.

A striking, and almost constant feature of leprosy is the uniform, bilateral distribution of macular lesion (Fig. 92).

Confusing pictures arise in the progress of some cases of leprosy, the result of one group of lesions being subsequently superimposed upon another. Figure 93 illustrates a nodular eruption, acute in nature, appearing on the back of a patient who already has been disfigured by large numbers of macules of various ages. Figure 94 shows the same back after subsidence of an acute process, and indicates the impossibility of delineating the macules.

Figure 95 illustrates a not unusual symmetrical distribution of plaques of various sizes, and Fig. 96 a somewhat more advanced, similar condition.

CLINIC OF DR. HENRY DASPIT

TULANE UNIVERSITY

TWO INTERESTING SKULL TUMORS ENCROACHING ON THE INTRACRANIAL SPACE[1]

GENTLEMEN: Though you have followed these two cases from their entry into the clinic and found the diagnosis confirmed in one case by operation, and in the other by operation and subsequent autopsy, a résumé in each instance is well worth while. The fact that in both instances surgical intervention was regarded as essential, in no way detracts from the pure neurologic interest.

The first patient, a white male, aged twenty-six years, presented nothing in his family or personal history of any note. He took an occasional drink, but could not be regarded as alcoholic. He never acquired any venereal infection. There is no history of head trauma. His past general health has been excellent. Occupation, traveling salesman.

In the early part of July, 1926, he noted early one morning a spontaneous attack of jerking in the right foot and leg without any other discomforting symptom. The monospasm was of no longer duration than two or three minutes, and the patient ascribed its passing to brisk rubbing with both hands. He noted no immediate inconvenience and continued his work. No disturbance of sensation was noted. The night before he had danced for a few hours and taken two or three drinks, but was in no sense intoxicated.

On close questioning, we find that there was no previous complaint. He had never experienced head pain, or noted any

[1] From the Clinic of Diseases of the Nervous System, Tulane School of Medicine.

vertigo or gastric distress. Equilibration had shown no disturbance. Nothing had occurred pointing to cranial nerve disturbance. For some weeks preceding the above noted monospasm, he had observed a small lump on the vertex when combing his hair. This lump was never sensitive, and had never caused him any concern.

During the next few weeks, there were several "attacks of jerking" in the right leg. The only other inconvenience, noted for some time, was a tendency to trip with the right foot. By mid-August, he states that he noted his brief-case would "flop" against his right side and that, unless he exercised special effort, such happenings annoyed him a great deal. Writing became much interfered with by a volitional tremor which developed about this time. By the latter part of October, there was a marked stiff weakness of the right leg and arm, and to a less degree of the left leg. He was, nevertheless, able to get about and carry on his business. Toward the latter part of November, he was unable to walk as the result of stiffness, not weakness. Tremor of the hands had developed to such a degree as to preclude writing or feeding himself. The mass at the vertex had materially increased in size. No disturbance had developed in the cranial levels, nor had sensation in any way become involved.

You will recall that, when this case was first presented to you on December 4, 1926, he showed a rather distinct tetraplegia of the cerebral type—both lower and right upper extremities of spastic type without sensory disturbance. No disorder was demonstrable in the cranial nerves, and the disks and fundi were quite negative. No distortion could be brought out in the visual fields. Neither nausea nor vomiting was present. The right grip was, by dynamometer reading, one-half that of the left. Marked volitional tremor was present in both hands, but distinctly more marked on the right. Tendon reflex was sharply exaggerated on the right, and undisturbed on the left. The right abdominal and cremasteric reflexes, though present, were definitely diminished. In the lower extremities the following was noted: Both knee- and ankle-jerks were pathologically exaggerated—

right much greater than left. Ankle-clonus was sustained on the right, but unsustained on the left. Typical Babinski and the associated skin reflexes were present on the right, but the responses were atypical on the left. There yet remains some question, as to whether or not a left Babinski could be elicited. The spasticity of the musculature was distinctly greater on the right side. Gait and station could not be properly tested, owing to the marked spasticity. It is to be noted that there was no disturbance in any form of sensation, and that speech was quite unaffected. The mass, measuring 4 by $3\frac{1}{2}$ cm., which was in the median line and definitely corresponded to the area of the paracentral lobules, easily made the localization. There was no pulsation of the mass. Coursing through the scalp proximal to the mass could be observed many large, new venous channels. The *x*-ray findings were as follows: "In the vertex of the skull, occupying the parietal bones, there is a large hiatus. This is funnel shaped, the smaller portion occupying the outer table, the larger portion the inner table. Both bone destruction and bone proliferation are visible here, and the bone production extends beyond the skull and up into the soft tissue. It is believed that meningioma and psammoma can be ruled out, due to the lack of sand-like bodies and the failure of the meninges to become thickened, and the diagnosis must rest between lues and neoplasm, since benign tumors would expand the cortex rather than proliferate. The remainder of the skull is intact, and no luetic process can be observed at any point in the skull. The changes observed are in keeping with malignant neoplasm probably of the osteosarcoma type, since we have both bone destruction and bone proliferation extending outward into the soft tissue. The erosion of the bone has been from within outward, and osteoporotic areas are visible about the margins of the lesion. Consultation with the clinician is requested" (W. F. Henderson).

A diagnosis of malignancy, most probably sarcoma, was made, and the case referred for operation.

You recall the operative procedure of December 11, 1926, when Dr. Maes, working under general anesthesia, made a long

incision in the midline through the scalp, and, in attempting to separate or detach the periosteum, the many large, pericranial sinuses—developing as the result of blocking of the superior longitudinal sinus—were divided, and the great loss of blood endangered the patient's life and precluded further detailed operative procedure. The mass was rapidly incised, and a small piece removed for microscopic study. 150 mg. of unscreened radium was then placed in direct contact with the mass and a large gauze-sponge sutured in to provide hemostasis. The radium was left *in situ* for twenty-four hours. Postoperative bleeding, which was troublesome, was finally controlled with calcium and horse serum.

Postoperative reaction was excellent. The patient complained of great dizziness while the radium was *in situ*, and for some twenty-four hours thereafter. This gradually subsided, and on December 21, 1926 the patient walked from the hospital merely with the aid of a stick.

The pathologic laboratory report on the tissue was that it was "gliosarcoma."

The patient is again presented to you today, June 1, 1927. You will note that he walks, unaided, with no marked gait disturbance other than that he may swing his right foot a bit. His general status is all that could be desired, and he has gained some 8 pounds in weight. He has been actively at work calling on the local trade since January. He states that his only disturbances have been slight, transient jerkings of the right foot during the night, about the middle of April and the first of May; that at times, after considerable walking, there is a sense of fatigue and heaviness in the right leg. Writing has again become normal and but slight tremor remains in the right hand. The right knee- and ankle-jerks continue to be somewhat exaggerated, and greater than the left. There is no left ankle-clonus, and the right clonus is now unsustained. There is a definite right Babinski, and the left plantar reflex is quite normal. The site of the incision shows a fetid slough due to the radium burn of the skin, though healthy granulations are evident. No vestige of the tumor mass remains. The uncicatrized area measured $3\frac{1}{2}$ by

$2\frac{1}{2}$ cm. A very significant thing to be noted is that there is definite pulsation of the exposed dura which was not destroyed by the radium. Should recurrence have developed, no pulsation would appear. The *x*-ray findings in the same laboratory now read: "The destructive lesion previously observed in the cortex of the skull is still visible, with little or no bone regeneration occurring, but no advancement can be observed from this plate over the previous observation. The cortex (skull) just anterior to the lesion offers suggestion of bone repair."

There are many points of interest in this case. The localization of the lesion, and the essential nature of the process were obvious and admitted of little question. The manner of handling a difficult situation brought about by the extreme hemorrhage from the new venous channels is of interest. The effect of the radium—3600 mg.-hours—is of great interest, with merely a skin burn, but no destruction of dura or brain cortex resulting. The post-operative behavior of the patient causes one to look with some question on the correctness of the pathologic laboratory report, which would indicate that the tumor was of cerebral origin. This certainly looks like an extradural affair. The presence of the intact, pulsating dura and apparently intact paracentral lobules is much more in keeping with an extradural malignancy.

It would be most unwise for anyone to be dogmatic as to ultimate prognosis, especially if the history of crural monospasm, postoperative, is considered and it is recalled that, owing to the necessity of interrupting the operation as the result of great hemorrhage, the dura was not exposed. We are, nevertheless, able through the experience with this case to confirm previous observations regarding the resistance of brain tissue, *per se*, to radium even in large dosage. Why the dura should have apparently escaped is another question.

The second case was observed by you after the condition was fairly well advanced, and when the diagnosis was in little doubt.

The patient, a white male, aged twenty years, barber, gives an entirely negative family history, and his personal history shows nothing of any consequence. Does not use intoxicants in any form and smokes but little. There has been no head trauma.

He was first observed in the Out-clinic of the Charity Hospital where he was referred by Dr. Hermann, who noted an absence of the jaw-jerk. Date of first observation, June 29, 1925.

The patient reported that he was quite well until February, 1925, when he developed an acute otitis on the right side with considerable head pain. The drum was incised, small amount of pus was drained. The pain was relieved and the patient comfortable for about six weeks. Right head pain, referred to the lower temporal region, returned, and was quite severe. Examination of the ear showed no pathology. At the time of the reappearance of the pain, he noted difficulty in opening his mouth. This was due to disturbance in the temporomaxillary articulation on the right, and was present on ordinary volition and also when attempts were made to separate the teeth with his hands. Pain had been very persistent, more marked in the evening, and did not respond to the ordinary analgesics. He also complained of right tinnitus.

The notes of June, 1925, show the following: A young, white male of excellent general status. Contour of head good. No deformities. No disturbance in sense of smell. Ocular balance correct. No ptosis. Pupils are equal and round, and react well to light and accommodation. Fundi are negative. Weakness of right masseter and pterygoids is found. The jaw-jerks is elicited with difficulty, and the response is largely in the left musculature. The inferior maxilla is practically fixed at the right articulation. Separation of but 1.5 cm. can be made. No disturbance of sensation is demonstrated. There is no facial imbalance. Right deafness is noted, which is found due to defect in the conducting apparatus and not in the nerve. Tinnitus is present. No dizziness or disturbance in balance has been noted by the patient. The drum is intact and shows the scar of reported incision. There is no weakness of the palatine musculature though the reflex is diminished on the right side. No disturbance was observed in either the tenth or eleventh innervation. There was no disturbance whatever in synergias, reflexes, or sensation in the trunk or extremities. *x*-Ray study of the skull was reported as entirely negative for evidence of pathology.

Consultation with the ear, nose, and throat department added nothing. Lesion near the cerebellopontine angle was suspected, and further observation asked.

During the next twelve months there was a constancy of the right head pain, but no increase in the trismus. The right masseter and pterygoids were flaccid. A flattening of the right labionasal fold became evident, though facial balance on volition was correct. Some pain was complained of in the right inferior maxillary region.

Examination in August, 1927, brought out, in addition to previously noted disturbance, a marked right facial weakness, reduction in the response to all types of sensory stimuli in the distribution of the right fifth cranial nerve. There now exists a marked reduction in the right corneal and conjunctival reflexes. Narrowing of the right palpebral fissure is obvious. Marked weakness is present in the right external rectus. The superior oblique and other extrinsic musculature is not as active as on the left side. There is enlargement (slight) of the right pupil, which reacts well to light. There is engorgement of the retinal veins, more marked on the right, but no edema of the disks is demonstrated.

About this time the patient, becoming impatient as the result of his lack of betterment, sought the aid of his family physician. We lost sight of him until February 7, 1927, when he returned to the clinic, complaining of an increase in all previously noted subjective discomforts. At this time, you first observed the case.

The head pain was then more severe, and was reported as radiating into the neck. Dizziness with nausea had developed. The patient remarked that he "walked like a drunk man", but showed no special tendency to fall in one direction. Every cranial nerve on the right, excepting the tenth, eleventh, and twelfth, was definitely involved. There was complete loss of smell on the right, visual blurring was complained of, and there was a two diopter choking on the right, one on the left, with marked engorgement of the retinal veins. The right pupil was quite dilated and irresponsive to light, and the right extrinsic ocular musculature was paretic. Marked facial weakness of the

peripheral type was present. The right masseter and pterygoids were inactive, and all types of sensation were wanting in the right face and mucosa. Taste was absent in the right side of the tongue. The right palatine muscles were paretic. Nerve deafness on the right was now marked. Dizziness was marked, and with it nausea and frequent vomiting which was in no way related to the ingestion of food. In the extremities, there was demonstrated a generalized left hyperreflexia. A moderate degree of adiadokokinesis was present in the left upper extremity. The left plantar reflex was atypical, the right normal. There was no clonus. The patient now noted that in walking there was a tendency to steer to the right, and a sense of falling in that direction. The contour of the face was materially altered. There is a distinct bulging in the lower temporal region on the right, more marked in the area anterior to the external auditory meatus. This entire area is tender on percussion and deep pressure.

The routine anterior-posterior and lateral *x*-ray studies of the skull were reported as negative at this time. As it was felt that the condition was a neoplasm of bony origin, further studies were asked and the following was reported February 18, 1927: "Plates of the mastoid region and the base of the skull show an abnormal density with definite outline, about the size of a half-dollar, in the region of the internal auditory canal, the middle ear, the semicircular canals, and the attic of the right side; the opening of the internal auditory canal is blurred, indistinct, appears to be eroded, and we note the same condition in the nasal view, with the entire extremity of the right petrous bone involved. The only conclusion is that we are dealing with a tumor of the right acoustic nerve" (A. Granger).

Consultation with ophthalmologist brought the following report: "The right eye presents a slight protosis together with exophthalmus; the pupil of the right eye is dilated 6 mm., is round and does not react to light or accommodation; there is an incomplete ophthalmoplegia totalis, the cornea of the right eye is insensitive, but clear; there is a facial hemianesthesia of the right side, the fundus shows the classic picture of neuroretinitis with marked bulging of the papilla, showing evidence of

increased intracranial pressure, the edema being more pronounced upon the nasal side. The peripheral fields show color interlacing with contractions of form. Two fields were made twenty-four hours apart under the same conditions of light. *Conclusion:* Hemicraniosis with dural involvement upon the right side could produce the symptoms. Would also consider basal tumor" (Dr. M. E. Brown).

After conference with the surgical staff, the patient was admitted to the ward on March 4, 1927 for operation. The day following admission severe hemorrhage which was very persistent and required frequent packing took place from the right nasal cavity.

The patient was operated in the forenoon of March 11, 1927. The notations in the Surgical Department are:

"Exploration with decompression:

"With the aid of local anesthesia, a horse-shoe flap was turned down over the temporal parietal region giving clear access to exploration of base. The dura was dissected away from the middle fossa and explored with finger, definitely turning the petrous edge. The dura was under great pressure, and the venous system of the brain markedly enlarged and engorged. The dura was opened by means of a crural incision and the brain bulged through this incision. There was an area in the cortex that was very dark blue and red in color, which was found to be an old hemorrhage. Exploration of the midfossa revealed no area that could be determined as more dense than another. The tentorium was found to be intact, with no bulging. The posterior fossa was explored extradurally. Two pieces of rubber-dam were introduced beneath the dura covering the brain, and the skin and the superficial tissue of the flap replaced with silk-worm sutures, after the bone had been completely removed.

"During the procedure, the right sigmoid sinus was opened and a gauze pack was introduced to control hemorrhage.

"*Note.*—An infusion of 500 c.c. of saline was given at conclusion of operation" (E. L. Irwin, M. D).

The patient died during the night of March 11, 1927.

At autopsy, the cranium only was opened, and the following reported:

"*Head.*—The cranial cavity was opened, and a hard mass was noted on the right side, which extended along the dura, being attached to the dura, and perforated the middle cranial fossa. On dissection the mass, after it had perforated the temporal and the sphenoid bone, was found to extend down the neck and into the sinuses of the right side.

"*Anatomic Diagnosis*—Endothelioma of the dura, extending through the temporal bone and floor of cranium. Tissue proved to be 'endothelioma arising from dura.' "

Though not in the written report of the autopsy findings, you were able to discern that the neoplasm apparently had its starting point in the petrous portion of the temporal bone, in the neighborhood of the attic. As it advanced forward through the midfossa of the base of the skull, and on reaching the jugular foramen, a point of low resistance, it eroded this opening—present measurements 3 by 3 cm. in the gross specimen—completely blocking all venous return by this route and a digitation of the growth "about the size of a half-dollar," extended into the neck. This was the mass defined in the final Roentgen-ray examination.

Careful study of the growth showed very little encroachment on the intracranial space, certainly not sufficient to explain the choked disk noted late in the disease. Though the growth extended into the right sphenoid and posterior ethmoid sinuses, and, by erosion, explained the epistaxis occurring after the patient's admission to the ward, there was not sufficient distortion of the groove occupied by the optic chiasm to justify the presence of the choked disk on the basis of direct pressure. It is interesting to note the occurrence of typical choked disk where the intracranial process was not sufficient to account for such, and where the explanation apparently rests in the obstruction of all venous return from the right brain. Careful search failed to reveal any interruption in the circulation of the cerebrospinal fluid.

While one may justify the surgical procedure advocated, on the basis that the patient was otherwise doomed and operation

would probably offer some prospect of relief, it is clearly apparent that operative interference was most ill-advised. If due significance had been given the diffuse bony enlargement of the right temporal region, a useless discomfort to the patient would have been avoided. Bony enlargements of the vertex or thereabouts may admit of operation, but where the base itself is involved surgery is futile.

CLINIC OF DR. ALLAN C. EUSTIS

BAPTIST HOSPITAL

INDIVIDUALIZATION IN THE TREATMENT OF DISEASE

OUR forefathers in the practice of medicine treated symptoms as they appeared in each individual patient; but, with the increased knowledge of pathology, a steady tendency, has developed directing therapeutic measures toward overcoming definite pathologic conditions. At present, however, if one analyzes the literature of our current medical journals he will notice the proclivity to treat the disease without a proper consideration of the individual patient, while there is an inclination in some of the larger clinics to group, or type patients, outlining a standard treatment for this particular group. That this tends to make one's diagnostic acumen less acute, I think, will be readily admitted, notwithstanding the fact that modern laboratory methods have increased our ability to make a correct diagnosis. I am inclined to believe, though, that the recent graduate in medicine is too often entirely dependent upon the laboratory for a diagnosis, failing to attach sufficient importance to the patient's history and the physical findings, while, not infrequently, the psychic and hygienic influences are entirely disregarded.

Having been a laboratory worker before engaging in the practice of medicine, I am fully aware of the value of the laboratory as an aid to diagnosis, but unless one is sufficiently trained to interpret the results, and this applies particularly to the newer branch of blood-chemistry, many patients will unnecessarily succumb to disease, while others may suffer preventable hardships. Errors in diagnosis on account of lack of proper appreciation of the individual are especially prone to occur in conditions resembling diabetes mellitus, nephritis, and hyperthyroidism, but are met

with in almost every disease, while no two cardiac cases present exactly the same therapeutic indications.

The case which I present to you today exemplifies fully the value of controlling the daily life of the individual in conjunction with other therapeutic measures.

B. F. T., white, male, sixty-three years of age, and president of a large wholesale grocery, being very busy in its management, is at present vigorous and active, and his firm musculature is the result of nine holes of golf daily. He has no symptoms now, but comes for periodic physical examinations.

Family History.—Father died at forty-five of exposure during the Civil War, and his mother at eighty-five of senility. One sister died in infancy, no brothers. He has been married thirty-seven years, and is the father of four children, all healthy, while his wife has never had a miscarriage. Venereal history is negative and he has never indulged in tobacco or alcohol.

Previous History.—Never seriously ill. Jaundice in 1922 lasting about two weeks, and relieved after a stay of two weeks at a resort whose waters are rich in magnesium sulphate. He had influenza in 1926, running a temperature of 102° F. for eight days, and was confined to his bed for twelve days. After getting up he returned to his regular business, which entailed his climbing several flights of stairs three or four times a day. I first saw him on February 24, 1926, three weeks after he had apparently recovered from the influenza, when he complained of weak spells, dyspnea on mounting stairs, dry cough of the paroxysmal type, and a tight, smothering feeling in his chest.

Physical Examination: Well-nourished, muscles fairly firm. Height, 5 feet, 8½ inches; weight, 185 pounds. Mouth—tongue moist and clean; teeth, one abscessed root. Tonsils small and not inflamed. Lungs, negative; d'Espine's sign negative. Heart, apex-beat inside nipple in sixth interspace, transverse cardiac dulness at apex 16 cm., with relative increase on the right side. Heart sounds indistinct, but no murmurs audible; rhythm regular, and no extrasystoles. Systolic blood-pressure varied every four or five beats from 110 to 130. Diastolic pressure 70. Response to the Dwight-Frost[1] cardiorespiratory test showed myocardial

weakness. Electrocardiogram showed inverted T waves in all three leads. Abdomen, negative. Patellar reflexes sluggish. Rhomberg's sign negative.

Discussion of Case.—Here was a case of evident myocardial degeneration, the result of influenza and focal infection, which nature had been unable to repair on account of constant cardiac strain, the result of mounting stairs. The evidence of myocardial weakness was noticed only after strain, so that a prolonged rest in bed was not only contraindicated, but might have predisposed to the development of hypostatic pneumonia. He was instructed to have the abscessed tooth removed, to climb no stairs for at least a month, and then very slowly, while he was also advised to lie down for one hour after each meal. I have found this latter procedure an excellent means of preventing the active business man, with mild myocardial weakness, from rushing through his meals to get back to work, and it enables the heart to obtain three hours' rest a day. He was impressed with the fact that he was sixty-two years of age and could not lead the same strenuous life as formerly. Digitalis was prescribed in the form of a standardized tincture, 15 gtt. three times a day, for four days, with an interval of none for four days, to be resumed in four days more. This method of administering digitalis is open to criticism, but I have found it an excellent method of obtaining the toxic effect of the drug upon the heart-muscle in patients whom I see only at long intervals, and who are so situated that they cannot be supervised by a competent clinician. This patient reported again for examination May 28, 1926, three months after I first saw him, when he gave the following history: His cough had disappeared in one week, he had not been troubled with dyspnea, and was feeling in perfect health. He had followed instructions implicitly, remaining away from his business two months, having ceased taking digitalis after one month, but had continued to lie down after each meal for three months. For the past month he had been remaining at his office, which was on the second floor, only until noon, and had thus climbed only one flight of stairs daily, and this had been done very slowly. Physical examination at this time showed the heart apparently

normal, with a transverse diameter of 15 cm. at the apex, systolic blood-pressure 130, each beat registering the same pressure, with the diastolic pressure 80. No murmurs were audible and the heart-sounds were distinct and loud. The response to the Dwight-Frost cardiorespiratory test showed a marked improvement in his myocardial efficiency. The physical examination was otherwise negative, except an increase in weight of 3 pounds. He was instructed to avoid putting a severe strain upon his heart, but was advised to take up golf, limiting his game to nine holes.

Discussion of Present Condition of Patient.—We have a well-preserved man of sixty-three, with good musculature and a sound heart, but with a history of past myocardial failure. He has been a hard worker all his life. To compel him to cease all business activities will probably result in melancholia, and he will not have sufficient incentive to live to take the proper care of himself to enable him to prolong his life. For the past year he has gone to his office daily until noon, except on Saturdays and Sundays, but he has turned over the details of the business to his son. He takes his time at his meals, lies down for an hour after each midday meal, and enjoys his nine holes of golf as much as any of the younger members of his club. His span of life, barring acute infection or accident, should be as long or longer than the average, because he has learned to take care of himself. Most physicians are too busy to consider the daily life of their patients and to advise them as to their activities, but in the individual past fifty years of age, I am of the opinion that such is more important than any medication. I am led to this conclusion by the number of senile cases which I have observed in the past. One man, in perfect health today at eighty-six, had a dilated heart in 1912, with marked renal involvement, and at that time warranted a prognosis of only a few months longer of life. An elevator in his home, and freedom from all business cares has done more to prolong his life than any medication. Another case at eighty-four years of age purchased an annuity from an insurance company with the full expectation of dying within two years, but he lived to the age of ninety-four, after he had secured a ground floor room and husbanded his strength.

Other conditions in which the individual should be considered may be cited.

ACHYLIA GASTRICA

For years I have urged a consideration of achylia gastrica as a symptom, and not as a disease, believing that a recognition of the underlying cause of the achylia is essential. We still, however, see most of our hospitals accepting achylia gastrica as a diagnosis in their yearly reports, and a short perusal of the histories of these cases reveals the fact that in most instances treatment has been directed solely in this direction. The achylia may signify cirrhosis of the liver, pernicious anemia, failing cardiac action, or some toxemia such as tuberculosis, focal infections, or chronic intestinal toxemia; or it may be intragastric in origin: neoplasms, atony of the stomach, or syphilis of the stomach. Unless treatment is instituted against the underlying cause, the result is only palliative and not curative, *i. e.*, an appreciation of the individual case is necessary for successful treatment. This is well exemplified in a case occurring in my own clinic at Charity Hospital during the late war, when I was short of assistants, and the patients could not be given the detailed attention they deserved.

Mr. A. A., white, male, fifty-three years of age, was admitted to the clinic complaining of belching and heavy feeling in the stomach, palpitation, and other symptoms usually found in cases of achylia. There was a definite negative history of syphilis, and, his gastric examination revealing an achylia, he was put upon dilute muriatic acid after his meals, with relief of his symptoms as long as he took the acid. After attending the clinic for three months, *x*-ray examination of his stomach was made, as well as a Wassermann reaction on his blood, the latter being ++++. A diagnosis of linitis plastica of luetic origin was made, and active antisyphilitic treatment was instituted with complete relief of his achylia and symptoms, even without the administration of muriatic acid.

Another instructive case was reported by me in 1915[2] at the meeting of the Louisiana State Medical Society, in which the achylia was secondary to a chronic intestinal toxemia, and which was relieved by overcoming the latter condition.

DIABETES MELLITUS

In the treatment of this disease, probably more than in any other, the individual is lost sight of in the maize of laboratory reports and dietetic sheets. In the past I have reported[3] numerous instances of transient glycosuria, nondiabetic, and have also attempted to enlist the interest of the profession in a consideration of infection of the gall-bladder as a causative factor in diabetes, as well as in transient glycosuria. In one of these papers, the conclusions arrived at, after a study of 36 cases extending over a period of eleven years, were as follows:

1. Transient glycosuria may be associated with a diseased gall-bladder.

2. The glycosuria may exist before symptoms of gall-bladder disease present themselves.

3. Such cases may progress to definite diabetes.

4. Treatment directed toward the diseased gall-bladder may temporarily relieve the glycosuria.

5. In one case such treatment (cholecystectomy) relieved the glycosuria over a period of five years.

6. More systematic examination of patients with glycosuria should be made, with the object of determining what percentage of glycosuria and true diabetes are associated with gall-bladder disease.

It is surprising how often diabetics give a history of, or show evidence of gall-bladder disease. In an analysis of 58 postmortem examinations of diabetics at the Mayo Clinic, Wilder[4] reported 16 (28 per cent.) as having gall-stones, while severe cholecystitis without stones was found in 4 others, (6.8 per cent.), a total of 34 per cent. showing gall-bladder disease. On account of the close anatomic relationship between the common bile-duct and the pancreas, it is obvious that infection in the former will tend to spread to the latter. Therefore, a mild diabetic with evidence of gall-bladder infection is more of a surgical than a medical case, and yet we find a large proportion of the medical profession resorting to duodenal drainage in the treatment of such conditions.

"NON-SURGICAL DRAINAGE OF THE GALL-BLADDER"

Most frequently we hear this procedure wrongly spoken of, as "gall-bladder drainage," and while I have conscientiously tried to obtain the benefit others have reported in infections of the gall-bladder, my results have been disappointing. In certain cases of acute catarrhal jaundice, it, undoubtedly, has a field of usefulness, but its scope is considerably narrowed when we consider the large number of dyspeptics who are suffering from adhesions between the gall-bladder and duodenum, the result of old infection. Where symptoms are due to such, or where there are symptoms of an acute infection of the gall-bladder, which is progressing toward empyema, little benefit can be expected, and, in the latter condition, fatal results may be expected from over-temporizing. I know of two fatalities, due to empyema of the gall-bladder, treated by duodenal drainage according to the method of Lyons,[5] which, undoubtedly, could have been saved by early drainage of the gall-bladder by laparotomy. Let us hope that in the future the surgeon will be willing to allow suitable cases of gall-bladder disease to be treated medically, and that the internist will gracefully admit that there are certain cases of this disease which can be treated successfully only by surgical measures.

NEPHRITIS

In nephritis there is, probably, greater opportunity to study the individual characteristics of each case than in the treatment of any other disease. The physician who restricts water and salt in all of his nephropathies, or the one who flushes all his patients with copious fluids, are both alike, sure to meet their Waterloo.

I do not recall any 2 cases of nephritis as being exactly alike, and this dissimilarity probably accounts for the wide divergence in the different treatments advocated; on the one hand, certain eminent authorities favoring protein restriction, and others pleading carbohydrate restriction with a high protein diet, while one finds as great a divergence regarding the amount of water or salt allowed. The essential facts to be borne in mind in the successful treatment of all nephropathies are: The cause of the

nephropathy, the condition of the heart-muscle, the function of the liver, and, especially, the acuteness or chronicity of the disease. A consideration of the daily life of the individual is also absolutely necessary. It is indisputable that a routine treatment for nephritis is not only illogical, but unscientific. In considering nephritis one unconsciously thinks of high blood-pressure, and, in this condition also, one must individualize. What might be a high blood-pressure for one person, may be compensatory and life saving to another. The patient with sclerotic arteries and atrophied kidneys requires an arterial tension, sometimes as high as 220 mm., to secure proper circulation through these organs, and any nitrites or nitroglycerin do more harm than good. The work of Richards[6] at the University of Pennsylvania proves conclusively that the excretory function of the kidneys is directly dependent upon the arterial pressure in the renal artery, which explains many of our earlier cases of an acute nephritis engrafted upon a chronic basis after the blood-pressure had been lowered by drugs.

ASTHMA

Asthma is generally accepted as due to some toxemia; and in relieving this condition, it is remarkable what excellent results may be obtained by a careful study of the individual patient to determine the source of toxic absorption: whether from focal infection, protein sensitization with resulting food poisoning, or, indeed, whether or not the patient is in reality a true asthmatic. Many cases of mediastinal adenitis, as well as cases of aneurysm of the arch of the aorta strongly simulate asthma. I recall one case of mine which had been treated for asthma for six years (prior to coming to me), but which close scrutiny proved to be a case of laryngeal crises from tabes dorsalis.

HYPERTHYROIDISM

With the wide-spread use of the portable apparatus for determining basal metabolism, it is but natural that many cases with a high basal metabolic rate should be wrongly classed as cases of thyrotoxicosis. It should be borne in mind that such

readings, to have any value, should be taken under most favorable conditions, namely: The apparatus must be free from leaks, the soda lime should be effective, the patient must be absolutely composed and at rest for at least half an hour, and that the determination should not be made except after a fast of at least sixteen hours. On the other hand, in the successful treatment of such cases, and in determining whether the case is medical or surgical, an accurate basal metabolic rate determination is indispensable.

Many other instances, in which a study of the individual is essential for successful treatment, could be cited, but I shall feel that my purpose has been accomplished, if I have been able to persuade a few that no two patients are alike, and that more time should be given by the *average practitioner* to the proper taking of a history of the patient, even though it may not be recorded, and that a thorough physical examination is always indicated before treatment is instituted; while treatment should entail a consideration of the daily life of the patient and the psychic factors in the case.

BIBLIOGRAPHY

1. Eustis, Allan: The Dwight-Frost Cardio-Respiratory Test as an Aid in the Early Recognition of Myocardial Insufficiency, Jour. Southern Med. Assoc., August, 1926, vol. 19, No. 8, pp. 585–590.
2. Eustis, Allan: The Use and Abuse of the Stomach Tube, Pan-American Surg. and Med. Jour., 1915, vol. 20, No. 6, p. 11.
3. Eustis, Allan: (*a*) Diabetes Mellitus and Its Differentiation from Alimentary Glycosuria," Amer. Jour. Med. Sci., June, 1914, No. 6, vol. 147, p. 830. (*b*) Further Notes on Alimentary Glycosuria, New Orleans Med. and Surg. Jour., January, 1918, vol. 70, No. 7, p. 566. (*c*) The Relation of Gall-Bladder Disease to Diabetes, New Orleans Med. and Surg. Jour., 1923, vol. 75, p. 449.
4. Wilder, R. M.: Necropsy Findings in Diabetes, Jour. Southern Med. Assoc., 1926, vol. 19, p. 241.
5. Lyons, B. B. V.: Can the Gall-Bladder Biliary Tracts be Medically Drained? Amer. Jour. Med. Sci., 1920, 160, p. 515.
6. Richards, A. N.: Kidney Function, Amer. Jour. Med. Sci., 1922, vol. 163, p. 1.

CLINIC OF DR. S. CHAILLÉ JAMISON

TULANE UNIVERSITY

STREPTOCOCCUS PNEUMONIA

A CASE of streptococcus pneumonia is presented.

The recognition of this form of pneumonia has come since the last pandemic of influenza, and it is now believed that the majority, if not all of the cases of pneumonia directly complicating "flu," and so often proving fatal, were due to streptococci.

Clinically, such cases occur, then, as part of the influenza syndrome, as ordinary bronchopneumonias, and as pneumonia secondary to general streptococcic septicemia. In the first instance, these pneumonias are often fulminating, death occurring in a few hours after the onset, and following the ordinary upper respiratory infection known as influenza; such cases show early collapse, deep cyanosis, extreme toxemia, and very few, if any, physical signs in the chest. In the second instance these pneumonias are, clinically, ordinary bronchopneumonias in their physical signs and clinical course, except that the disease is nearly always very severe, the lung involvement massive and bilateral, and the outcome usually fatal; the etiologic cause of this disease is certain to be overlooked unless the sputum is carefully studied. In the third instance these pneumonias are part, and usually a terminal phase, of general streptococcic septicemia.

Pathologically, two types of streptococcus pneumonia are recognized: the interstitial and the bronchopneumonic. The interstitial form presents a lung which is voluminous, the cut surface of which is red, and which does not show varying areas of red and grey hepatization; a large quantity of hemorrhagic

fluid may be squeezed from such lungs. In the bronchopneumonic form the findings do not differ from the pathology of the ordinary bronchopneumonias.

Pierre Mitchell, a colored male, forty-eight years of age, was admitted to the Charity Hospital, service of Dr. Jamison, on March 25, 1927. He complained of cough, pain in the right side of the chest, and fever. About ten days prior to admission he had a slight cough, some fever, coryza, and malaise, but continued his ordinary occupation as a laborer. Five days later he was suddenly seized with a severe chill, fever, and pain in the side. He immediately went to bed. His cough now became constant and painful, and was accompanied by a profuse, tenacious, and purulent sputum, which was not bloody. Delirium developed two days before admission. There was nothing in the past or family history that bore on the present illness. He drank and smoked heavily, but to no greater extent than the majority of his class.

Examination.—A well nourished and developed, almost black negro male of about fifty years. Because of delirium forcible restraint in bed was necessary. The respirations were regular, shallow, and 37 per minute. The pulse was full, regular, and 120 per minute; the blood-pressure 120/80. On examining the chest the right side did not expand as fully as the left. Over the whole of the right side of the chest the fremitus was increased, the percussion note varied from flat to dull, the voice sounds were increased, the breath sounds were suppressed but bronchovesicular in character, and there were many fine and coarse crackling râles. The left side of the chest presented nothing of note. The apex-beat of the heart was diffused, but no increase in size of the organ could be demonstrated by percussion, and there were no murmurs. Physical examination was otherwise negative.

Laboratory examinations:

March 26, 1927—Total white blood-corpuscles 20,250 per c.mm. Neutrophils 94 per cent.

March 29, 1927—Total white blood-corpuscles 15,000 per c.mm. Neutrophils 90 per cent.

March 30, 1927—Total white blood-corpuscles 14,000 per c.mm. Neutrophils 90 per cent.

One blood-culture was negative. The Wassermann was negative. The urine was constantly normal, chemically and microscopically, though only the routine examinations were made.

The examination of the sputum demonstrated a few pneumococci, which failed to react with Type I, II, or III sera, thus placing it in Group IV; the predominating organism, however, was a streptococcus.

During the five days that the patient was under observation the temperature varied from 100° to 103° F.; the pulse from 108 to 130; the respirations from 24 to 48. The delirium was constant. No jaundice or cyanosis was observed. The patient steadily became more toxic and weakened, and slowly sank into a stupor which preceded death by a few hours. Besides the ordinary routine symptomatic treatment of pneumonia, the patient was given intravenously 200 c.c. of Type I serum on the 26th, 100 c.c. polyvalent on the 27th, 100 c.c. of antistreptococcic serum on the 29th, and another 100 c.c. of antistreptococcic serum on the 30th. No serum reactions were observed. The patient died early in the morning of March 31, 1927, and the autopsy on April 1st demonstrated a massive lobular pneumonia of the right lung, acute (toxic) myocarditis, hepatitis, and splenitis, acute and chronic nephritis.

Discussion.—This case illustrates an ordinary bronchopneumonia due to the streptococcus. The importance of typing the sputum and studying the morphology is well illustrated, as the antemortem, as well as the postmortem diagnosis would have been incomplete without such studies. It should be clearly understood that more than one type of pneumococcus may be present, or one type of pneumococcus and also some other organism; this is not the general rule.

CLINIC OF DR. C. L. ESHLEMAN

TOURO INFIRMARY

PURPURA HÆMORRHAGICA

FIVE cases of malignant or idiopathic Purpura Hæmorrhagica have come under observation in the Medical Service of the Touro Infirmary in the past three years. Three of these have had a splenectomy and the disease controlled thereby, and they are apparently well at this writing. Four have had blood transfusions with variable results. One of the five has died after repeated transfusions, but without splenectomy. A fifth has apparently recovered her good health without transfusions or splenectomy or any other treatment.

The clinical and laboratory studies and treatment should permit some observation and comments of interest regarding this not very common disease.

Let me first make it plain that none of these cases were simple cases of cutaneous or mucous membrane hemorrhage, such as we sometimes see in connection with other diseases. For instance, we know that certain infectious diseases sometimes have a tendency to cause hemolysis, which may be manifest by ecchymotic spots in various parts of the body, or perhaps bleeding from mucous surfaces, such as the nose, gums, pharynx, stomach, intestines, or genito-urinary tract. Yellow fever is one of the infectious diseases in which the toxin causes a hemolytic jaundice with gastric and sometimes cutaneous hemorrhages. Influenza, or its common consort the hemolytic streptococcus, is another. Smallpox, measles, scarlet fever, acute rheumatic fever, epidemic cerebrospinal meningitis, septic endocarditis, typhoid, and typhus are others which sometimes produce hemorrhagic manifestations, especially when the infection is virulent.

Cancer, nephritis, diabetes, pernicious anemia, and other blood dyscrasias are at times associated with purpuric skin eruptions. In all such diseases purpura should be regarded as secondary or symptomatic, and should not be confused with the condition I am discussing, in which, first, a rather typical group of blood findings can be demonstrated and, second, no concomitant disease can be found that might be considered a causative factor.

Of course, no one can say that infection may not later be shown to be an important causative factor in this disease, producing effects in some way, unknown to us at present, in the reticulo-endothelial blood system which seems to be at fault.

Clinically, we might recognize several types of purpura: (1) Purpura simplex might well be applied to a condition in which small ecchymotic spots occur at times, in an otherwise normal individual, without any known cause, and with no tendency to any mucous membrane bleeding. It is transient and of short duration, as a rule, without evidence of anemia. Such cases might well be considered, however, as possibly early cases of thrombocytopenic purpura, and should be given careful study and sufficiently prolonged observation to exclude it.

(2) The term "symptomatic purpura" should be confined to those cases which are secondary to some other well recognized infectious or constitutional disease.

(3) Malignant or idiopathic purpura or thrombocytopenic (thrombocytolytic) purpura hemorrhagica should indicate a condition in which cutaneous hemorrhages occur and a tendency to bleed from any mucous surface. It is associated with anemia, more or less severe, of a secondary type with low color index, a marked reduction in the platelets or thrombocytes of the blood, a normal coagulation time, a prolonged bleeding time, and a failure of the blood-clot to retract. These blood findings are fairly constant, and are the distinguishing features of the disease. Its etiology and pathology are still obscure. That platelet deficiency is an important factor is recognized, but all of the details connected with this deficiency and the hemorrhagic ten-

dencies are not yet fully understood. Whether platelets are not formed in sufficient number by the megakaryocytes of the bone-marrow, or whether they are formed but are destroyed at an abnormal rate by the reticulo-endothelial cells, is not definitely known. The abnormal rate of destruction theory (thrombocytolysis) is given most credence. It is thought that if the spleen is the organ at fault in this thrombocytolysis, a strong indication presents in favor of its removal. If, on the other hand, other parts of the reticulo-endothelial system, such as the liver, the lymph-glands, bone-marrow, and connective tissue are also at fault, splenectomy is likely to be a failure.

The cases which have occurred in our Service at Touro present a number of interesting features which can be commented upon as each case is presented.

Case I.—This young American white woman of twenty-one entered the hospital February 27, 1927, on account of bleeding gums and bluish-black spots all over her body. Her family history is unimportant; there has been no tuberculosis or cancer or hemorrhagic tendencies in the family.

Previous Illnesses.—Pertussis at six. At ten, pain and stiffness in one hip, confining her to bed for two months; was on crutches for six weeks longer, but recovered without any subsequent disability. No other joints involved then or since. No hemorrhages at that time. Malaria, at times, from thirteen to seventeen. At eighteen, much indigestion for eighteen months. At nineteen, tonsillectomy. Early in 1926, influenza; sick three weeks.

Present Illness.—For about three years has noticed that large bluish-black spots like bruises would appear in various parts of her body, gradually fading and disappearing in two or three weeks. As many as six or seven large spots at a time. In July, 1926, her gums bled for three days, and there were several large, hemorrhagic spots on her body. She felt exhausted and remained in bed one week. Her physician gave her 3 drops of horse serum daily for three months. During this time was always lacking in energy. In spite of this she began her teaching duties in Sep-

tember. In October and November was fairly well, but had occasional purpuric spots. About the latter part of December they became more profuse. In the middle of January, 1927, an attack of severe pain in right iliac region, radiating upward, and culminating in twenty-four hours, with general abdominal soreness for a day or two. Numerous purpuric spots began to appear now. About the end of January her gums began to ooze blood, which has not ceased. Two weeks ago she was given "four shots of horse serum," the last one eight days ago. Her condition continued to grow worse.

Physical Examination.—A well-nourished, but very pale young woman of normal development. General condition fair. Small pin-head to pea-size purpuric spots are scattered profusely over arms, legs, chest, abdomen, back, and face. A number of larger hemorrhagic areas also present on the body and extremities, varying in size and shape. They have the appearance of bruises and are in various stages from the dark, bluish-black, fresh areas to the paler, fading, yellowish-green discolorations of longer duration. About eighteen or twenty small, discreet, widely scattered, urticarial wheals on other parts, evidently the result of the recent serum inoculations. Much discomfort from itching. Eyes, ears, and throat negative. Nose shows signs of recent bleeding. Teeth look good, but gums are spongy and covered with fresh blood. Blood-mixed saliva is being constantly expectorated. The breath is foul. The lower lip is crusted with dried blood. Neck is negative. Chest well developed, respiration normal, lungs normal. The heart is of normal size, rapid and regular. Sounds only fairly well heard, a soft systolic murmur in pulmonary area with no marked area of transmission. Pulse, 110 per minute. Blood-pressure, 116/68. Abdomen flat, no masses or tenderness. Liver not enlarged, spleen not felt. Both legs are slightly edematous to the middle third, the left a little more so than the right. Reflexes, normal. No general adenopathy. Red cells, 2,050,000. Leukocytes, 8250. Hemoglobin, 25 per cent. Color index, .62. Platelets 80,000. Polynuclear leukocytes, 68. Small mononuclear leukocytes, 32. Coagulation time, three minutes. Bleed-

ing time, one hour and fifteen minutes. Non-retractile clot. Urine negative.

Comment and Progress.—This case presents the typical history of a moderately severe type of chronic thrombocytopenic purpura hemorrhagica. Mild purpura at times for three years, slight bleeding of gums once for three days, then improvement, but a recurrence of purpura and steady mucous membrane hemorrhage, so that on admission she had the marked secondary anemia most all of these cases show, but more important was the reduction of platelets from the normal 250,000 to 80,000, the normal coagulation time but very prolonged bleeding time and non-retractile clot. What was to be done for her which had not already been tried? Two plans were considered. First, an immediate splenectomy; second, repeated blood transfusions. While her condition was fair, it was decided to attempt to raise the platelet count and, if possible, control the bleeding by transfusions. Three days later her platelets having dropped to 30,000, she was given 500 c.c. of whole blood taken from her mother. Next day platelets were 45,000, and she looked less pale and felt a little better, but no special change in the bleeding could be noted. Two days later it was noted that she had developed no new purpuric spots, but was continuing to bleed from gums, also the nose and uterus. Applying a tourniquet to the arm tight enough to control the venous return, but not sufficient to cut off the arterial supply, caused numerous fine pin-point purpuric spots over the whole arm below the line of constriction. Next day she seemed weaker and her heart action showed a gallop rhythm, rate 130 per minute. Red cells, 2,070,000. Leukocytes, 11,500. Hemoglobin, 20 per cent. Platelets, 80,000. Six days after the first transfusion, a second one was given and splenectomy set for the next day, as she was not improving, but growing weaker and still bleeding. On March 9, 1927, ten days after admission, a splenectomy was done by Dr. R. E. Stone. The spleen was slightly enlarged, but hardly large enough to have been palpated. Five hours after the operation all bleeding had stopped and has never recurred. Her convalescence was slow on account of the severe anemia, but uneventful. Three days

after operation the blood showed 155,000 platelets; red cells, 1,910,000; hemoglobin, 20 per cent.; leukocytes, 29,650. Three days later the platelets were 240,000, the red cells and hemoglobin increasing, and many nucleated red cells found. Two weeks after operation coagulation time was one and a half minutes, bleeding time less than one minute, blood-picture gradually improving. She went home in three weeks, and has reported steady improvement since.

Case II.—An Italian of sixty-eight, applied to the Outpatient Department on September 27, 1924, complaining of bleeding gums, dizziness, and weakness for five weeks. Family history negative.

Past Illnesses.—None of any consequence. Yellow fever eighteen years ago. Occasionally colds. Negative venereal history.

Present Illness.—About eight months ago bled intermittently, a day or two at a time, for two months. He felt fairly well and did not cease work. Five weeks ago the bleeding began again, and was more profuse and almost continuous. He soon began to note weakness, dizziness, and loss of appetite. Two weeks ago his feet became swollen. Has no pain, but sleeps poorly. Feels feverish. Estimates his loss of weight to be 6 pounds in past month. Exertion causes dyspnea and palpitation, but he has no cough nor expectoration. Is constipated and takes salts twice a week; no nausea or vomiting. Urine, three times at night, twelve during day, no pain, no blood noted. Frequent headaches relieved by purgatives.

Physical Examination.—A well-developed, well-nourished, anemic man. Head, eyes, ears, nose negative. Teeth fairly good, but gums are pale and spongy, and interspaces between teeth are filled with blood-clots. The left lateral border of tongue shows a small submucous diffusion of blood, about 4 mm. in diameter. The breath is foul. Neck shows visible venous pulsations, posterior cervical glands felt. Lungs negative. Heart-sounds regular, a loud double blow at the apex and base with moderate enlargement. Blood-pressure, 152/68. Vessels sclerotic. Liver

not enlarged, abdomen flat. Spleen readily felt descending with respiration, not tender, about two fingers below the costal arch. Extremities show no bony deformity, marked edema of both legs to knees, slight posterior sacral pitting. Two large, purplish-black purpuric areas below the internal malleolus of each ankle. Numerous minute ecchymotic spots on both legs to the middle third, some fresh, some fading. Red cells, 1,070,000. Leukocytes, 6000. Hemoglobin, 35 per cent. Color index, 1.7. Polynuclear leukocytes, 72. Small mononuclear leukocytes, 27. Large mononuclear leukocytes, 1. Moderate anisocytosis and poikilocytosis. One nucleated red found. Coagulation time, four minutes. Platelets, 10,000. Wassermann, negative. Urine, very bloody; sediment shows few granular casts with blood and pus. He was admitted to the indoor service. A surgical consultant advised daily intravenous injections of 5 c.c. of 10 per cent. $CaCl_2$ for three days, and prospective splenectomy.

An *x*-ray of bones showed a marked periosteal thickening of the right femur, at junction of middle and lower third, interpreted as luetic osteitis. Marked atheroma of the vessels could be seen in the plate. Sixteen days later the same periosteal thickening was seen on re-examination. A test-meal showed free HCl 7, total acidity 27. Stools were negative.

Progress and Comments.—On October 15, 1924, two days after admission, he was given 300 c.c. of blood from son (Joe). At this time was bleeding from gums, had moderate purpuric spots, and urine had been intermittently bloody.

October 17th. Obviously much better; bleeding had practically ceased. Was cheerful and said he felt much better.

October 18th. Better, but in view of the insignificant increase in platelets, from 5000 to only 20,000, he was given another transfusion of 400 c.c. from same donor.

October 21st. Did not look so well today. Had been bleeding slightly for the past two days, though not as much as on admission. A third transfusion of 500 c.c. was given from son (Maurice).

October 22d. Had bled considerably from gums all during the night. Complained of feeling weak. Specimen of urine this

A. M. showed blood macroscopically. Spleen easily felt. Back and flanks showed many small petechiæ, and scratch marks showed hemorrhagic crusts. Loud systolic murmur over whole precardia. Pulse had Corrigan quality.

October 24th. Platelets, 10,000.

October 26th. New crop of small purpuric spots on legs. Four herpetic vesicles, two on each lip, were hemorrhagic.

October 27th. A fourth transfusion of 500 c.c. citrated blood.

October 28th. Transfusion yesterday had not improved him in the slightest. He was apathetic and decidedly dyspneic, with new herpetiform lesions on lips. Spleen was larger. Platelets, 15,000.

November 2d. Since yesterday bleeding had diminished.

November 3d. Bleeding had completely stopped.

November 5th. Very little bleeding noted.

November 6th. Fifth transfusion, 500 c.c., from son (Nathan).

November 9th. Bleeding from gums had increased since last night; larvæ of strongyloides found in stools.

November 12th. To-and-fro murmur over whole precardia. Moderate bleeding.

November 17th. Still bleeding from gums. Platelets, 15,000.

November 18th. Sixth transfusion, 500 c.c. from son (Nathan).

November 20th. Bleeding very little. No new spots. Platelets, 5000.

November 23d. Bleeding had ceased, felt pretty good. Platelets, 10,000. Blood-pressure, 150/70.

November 25th. Scratching caused bleeding, urine showed blood macroscopically in centrifuge. Slight cough.

November 28th. New petechiæ on feet and legs today. Complained of inability to get breath at times, coughing more. Sibilant râles in large tubes, crepitant at the bases. Heart more rapid.

November 29th. Seventh transfusion, 500 c.c. Evidence of edema of the lungs continues. Blood-pressure, 146/60.

December 1st. Mounted fresh specimen of blood stained

with cresyl-blue showed reticulation apparently normal in amount. Not increased. Hemoglobin, 10 per cent. Red cells, 1,750,000. Platelets, 15,000. Marked anisocytosis and poikilocytosis, one nucleated red to 300 leukocytes. Leukocytes, 12,250.

December 3d. Still bleeding. Blood-pressure, 120/44.

December 9th. Many new petechial spots on body. Sodium cacodylate started.

December 13th. Face blanched, very dyspneic. Bleeding from prick of hypodermic needle. Had to be propped up in bed to breathe, pulse rapid and weak, expression anxious, expectorated bright red blood.

December 14th. Died this morning at 7 A. M. Permission for autopsy could not be obtained.

Comment.—This was an extremely severe case of the chronic type, beginning mildly eight months before admission. When I first saw him in the Out-patient Department, he was already in a serious condition from bleeding and anemia. Syphilis has never been thought to bear any relation to this disease, and I do not consider it seriously as a causative factor in this case. On my first examination he had a loud to-and-fro murmur at the base, which made me think of aortic regurgitation and syphilis. He also had a Corrigan type of pulse and a wide pulse range. Two blood Wassermanns were negative, however. Later, after he went to the indoor service, the diastolic murmur disappeared and the systolic murmur was prominent. I then thought his murmurs were hemic in character. Later the diastolic murmur was again heard and then disappeared. The *x*-ray report of his femur is interesting, and two of three radiologists have considered it a syphilitic periostitis.

By the chart (pages 710, 711) you will note that he had seven transfusions, given at three-day intervals at first, and later ten to twelve days apart; also that three different donors were tried and a satisfactory amount of blood, 500 c.c., was given. In spite of this his platelets could never be raised to more than 20,000. By the progress notes you will also see that at times he looked like he might improve, when his bleeding ceased for two or three days,

CHART OF CASE II, SHOWING SEVERE ANEMIA, PERSISTENT LOW PLATELET COUNT IN SPITE OF TRANSFUSIONS FROM SEVERAL DIFFERENT DONORS. NO SPLENECTOMY. DIED.

Date.	Hem., per cent.	R. B. C.	C. I.	W. B. C.	Polys.	S. M.	L. M.	Eosin.	Baso.	Platelets.	Remarks.
9/27/24	35 (T)	1,070,000	1.7	6,000	72	27	1	....	....	.....	Wassermann, negative. Coagulation time, four minutes.
10/ 9/24	35 (T)	1,400,000	1.2	10,000	75	21	1	2	2	.....	Anisocytosis, poikilocytosis; 1 nucleated red.
10/14/24	12 (D)	1,330,000	0.46	3850	73	21	1	4	....	.....	Marked anisocytosis, poikilocytosis. No malaria. Few nucleated reds.
10/15/24	10 (D) 20 (T)	1,450,000	....	....	....	....	....	....	....	Before transfusion, 5000	Coagulation time, two minutes. Bleeding time, one hour. First transfusion, 300 c.c.
10/16/24	10	1,670,000	0.31	4350	58	36	....	6	....	20,000	Anisocytosis, poikilocytosis. Polychromatophilia.
10/17/24	....	....	....	....	....	....	....	....	....	15,000	Before second transfusion.
10/18/24	15	1,670,000	....	....	....	....	....	....	....	.....	Second transfusion, 400 c.c.
10/20/24	20	1,445,000	0.71	2775	64	32	....	4	....	.....	Anisocytosis and poikilocytosis. 1 nucleated red. Wassermann, negative.
10/21/24	....	....	....	....	....	....	....	....	....	.....	Third transfusion, 500 c.c.
10/22/24	10	1,650,000	0.31	4475	78	18	....	2	2		
10/24/24	....	....	....	....	....	....	....	....	....	10,000	
10/26/24	15	945,000	0.82	3875	68	25	....	4	3	.....	Anisocytosis and poikilocytosis.
10/27/24	....	....	....	....	....	....	....	....	....	.....	Fourth transfusion.
10/28/24	....	1,450,000	....	....	....	....	....	....	....	15,000	
10/31/24	10 (D)	1,170,000	0.45								

11/ 5/24	10	1,368,000	0.37	6500	61.5	29	....	9.5	....	.....	1 nucleated red per 100 leukocytes.
11/ 6/24	....	....	....	....	....	....	....	....	....	.....	Fifth transfusion, 500 c.c.
11/17/24	17 (D)	1,493,000	0.6	6200	66	28	....	0.6	....	15,000	No nucleated reds.
11/18/24	....	....	....	....	....	....	....	....	....	.....	Sixth transfusion, 500 c.c.
11/20/24	....	....	....	....	....	....	....	....	....	5000	2 nucleated reds per 100 leukocytes.
11/23/24	18 (D)	1,590,000	0.58	4500	74	22	....	4	....	10,000	Seventh transfusion, 500 c.c.
11/29/24	....	....	....	....	....	....	....	....	....	.....	No nucleated reds. Anisocytosis and poikilocytosis. Polychromatophilia.
12/ 1/24	10	1,750,000	0.3	7500	58	32	....	10	....	7500	1 nucleated red to 300 leukocytes. Anisocytosis and poikilocytosis. Polychromatophilia.
12/10/24	10	2,071,000	0.25	12,250	64	30.5	....	5.5	....	15,000	

but it was never anything more than a temporary lull in his symptoms, which were really progressive, and the course always steadily downward with a most profound anemia. No chance of controlling this as long as the almost constant bleeding continued. He should have had a splenectomy after it was seen that the first few transfusions were not accomplishing anything permanent. When transfusions do good they raise the platelet count quickly, and bleeding often stops at once; but, often, the platelet count drops again in a few days. If repeated transfusions every few days keep boosting the count higher and higher, and bleeding stops, then a very opportune time for splenectomy is present. I do not know why it was not done in this case. Perhaps the patient or family would not consent; perhaps the attendant thought his condition too serious, at all times, to take a chance with what is a rather formidable surgical procedure. A short pedicle, or splenic adhesions sometimes increase the difficulty; tying the pedicle is not always easy. A bleeding subject is not a good operative risk at any time, but it is remarkable in some cases how quickly the bleeding ceases, sometimes almost as soon as the pedicle is clamped and tied. Many patients leave the operating room in better condition than before. Postoperative shock is often fatal in those weakened by anemia severe enough to cause edema of extremities and hemic heart murmurs. This patient was certainly at all times an extremely poor surgical risk, but I believe a splenectomy was his only chance after the first few transfusions had failed to benefit him.

Even splenectomy might not have cured him, provided he survived the operation. Our knowledge of the disease is too meager yet to explain surely why splenectomy shows such astounding results with some cases and is an immediate or subsequent failure with others.

Perhaps the explanation given by Whipple, which I will quote in commenting on the next case, may throw further light on it.

Case III.—A white male of sixty-one was seen in consultation on April 14, 1926. For three days he had noted numerous purpuric spots on his body and extremities. His gums were also

oozing blood. Family history negative for any hemorrhagic diathesis. Married, wife living and healthy, never any children.

Past History.—In May, 1923 he had a mild arthritis, and Wassermann recorded as ++. Antiluetic treatment was given. In August, 1923 a nose and throat specialist found an ulcer of the nose, which he considered probably luetic, and treated from May to September, 1923. He had had occasional attacks of abdominal pain, which suggested a pathologic gall-bladder or appendix. At intervals in past six years he had had teeth extracted on account of abscess, and he was about to have several more extracted three days ago, but it was postponed when the purpuric spots were noted. In March he had fever and cough. It is said that moist râles have been present at the base of right lung for practically a year, interpreted as a bronchiectasis. Weight had been increasing gradually. There had been no previous hemoptysis. Blood-pressure averages 175.

He had had eleven injections of arsphenamin in the past three months. There was no luetic history, yet Wassermann had been ++ on a number of occasions. He had shown a rather pale, pasty, unhealthy color for years.

When seen he was comfortable in bed, pale and anemic, with many small purpuric spots, none larger than ½ cm. in diameter, scattered over body and extremities. His gums were bleeding moderately. Heart sounds were regular, of good quality, rate 96, no murmur heard. Lungs showed a moderate area of dulness at the right base, over which the breath sounds were not altered but moist râles heard. Abdomen was flat, liver not enlarged, spleen not felt. On account of bleeding of gums, it was difficult to say whether he was coughing up blood from his lungs or not. Patellar reflexes present. Urine chemically negative, microscopically many red blood-cells. Platelets the day before admission were 32,500, today 25,000. Bleeding was as free after thirty minutes as when first started.

Comments.—The attendant was anxious for a transfusion and an immediate splenectomy, a few hours later expressing the belief that unless it be done at once he would die in three to five days. I thought the transfusion indicated and it was done at

once, but I doubted the advisability of a hasty splenectomy as being too risky. Certain facts deserved careful consideration. The patient's condition was fairly good—it was his first attack and of three days' duration. It was difficult to determine whether he was bleeding into the lung or not. What was the pulmonary condition? Was it possibly malignant or luetic? Microscopic blood was in the urine. An *x*-ray of chest was requested. It showed signs ordinarily observed in bronchiectasis, and also an infiltrative process of the type suggesting lues.

Was he presenting the symptoms of onset of the severe, acute fulminating type, in which Whipple believes that not only the spleen but also other parts of the reticulo-endothelial system are at fault? If so, splenectomy would not cure him, and the operative records show a mortality of 88.5 per cent. On the other hand, if he was in his first attack of what was to be the recurrent type, the necessity for the immediate splenectomy was not great. Repeated transfusions every few days in an effort to raise the platelet count and stop the bleeding would have furnished a more opportune time for the operation, which, in this type, is attended with a mortality of only 8.2 per cent. and is a permanent cure. Whippel's summary cannot be better expressed than by quoting several paragraphs from his most excellent article.

He says: "The main point to decide, once the diagnosis is made, is whether the patient has the disease in the chronic recurrent form or whether it is an acute fulminating type. The former type is usually promptly and permanently cured by splenectomy, the latter type is seldom helped by the procedure. The chronic recurrent type of the disease gives a history of repeated attacks of petechiæ, purpuricare as, irregular bleeding from gums, and in women menorrhagia. Bleeding is, as a rule, not very profuse, and is not so apt to occur into the alimentary canal or into the parenchyma of the organs. The fact that splenectomy cures would imply that the major disturbance of the reticulo-endothelial system is localized to the spleen.

"The acute fulminating type usually gives no history of former petechiæ, but there occurs sudden, severe, uncontrollable

oozing of blood from mucous membranes and into the subcutaneous tissues and organs. Hematemesis, hematuria, blood in stools in severe form are more apt to occur. These cases do not respond to one transfusion as promptly as do the chronic forms, but may require repeated transfusions before the bleeding stops. In one of the cases from the Mayo Clinic twelve transfusions were given in forty days. These cases should be tided over by transfusions until the bleeding has stopped, and, when built up, splenectomized to prevent a recurrence.

"In the 81 cases collected there were 8 cases operated upon during the acute stages with 7 deaths—all within a very short time after the completion of the operation. Of the 73 cases of the chronic form there were only 6 postoperative deaths, showing the relative safety of splenectomy in the chronic form."

Further Progress.—Eight hours after the transfusion he was operated and the spleen removed. The platelets a few hours after the transfusion had increased from 25,000 to 42,500. The day after the operation to 57,500, two days after to 95,000, three days after to 145,000, five days after to 325,000, nine days after to 335,000, and three weeks after they were 330,000. The anemia cleared up slowly, and all bleeding ceased immediately after the operation. He has had no further bleeding since, over a year having elapsed.

Case IV.—A very obese white woman of seventy-six appeared at the Out-patient Department on account of a large black-and-blue area on the right side of her face. She stated that three days ago she felt some fluid exuding into her mouth and, on expectorating, noted that it was blood. The next day the bruised area appeared on her face.

Family history of no interest. She had had no serious illnesses of consequence. Rheumatic pains of a vague character for thirty years. Seven years ago had a small ulcer on the left side of her nose which would not heal. Nose treated in the clinic as a precancerous ulcer and soon healed. Severe headaches for several years—dizziness at times.

Physical Examination.—A very fat white woman of German

extraction and of rather poor mentality. Head grossly negative. Eyes, arcus senilis; slightly deaf. A large ecchymotic area the size of one's hand over the right lower maxilla, extending from the angle to the corner of the mouth and downward to the mid-cervical region. Her breath is foul. All teeth absent except two lower molars on the right and one on the left, which are dirty, and the gums retracted and unhealthy. On the right buccal mucous membrane is a submucous hemorrhage about 2 cm. square. Scar of the old nasal lesion is about 2 cm. long. Lungs negative. Heart sounds heard with difficulty on account of fat, but apparently normal. Abdomen very fat, no organs palpable, no tenderness. Several small ecchymotic spots seen, the largest 8 cm. in diameter. The lower legs show numerous scattered pin-head-sized purpuric spots, a few on the thighs. The urine was negative except for a few scattered red blood-cells. Red cells, 4,490,000. Leukocytes, 5000. Hemoglobin, 70 per cent. Polymorphonuclear leukocytes, 66. Small mononuclear leukocytes, 28. Large mononuclear leukocytes, 6. Bleeding continued from puncture after seventeen minutes. Coagulation time three and three-quarter minutes. Platelets, 55,000. Non-retractile clot after twenty-eight hours. Hess tourniquet test negative.

A surgeon and two internists all agreed that, on account of her age and size, she was a very poor surgical risk. Her condition was good, however, there apparently being no bleeding from any organs and practically none from any mucous surfaces, such as nose or mouth. It was decided to watch her closely and transfuse, if necessary, and only consider splenectomy as a last resort.

For two weeks additional areas of purpura appeared on the abdomen and thighs and legs and arms, most of them in the form of large ecchymotic areas like bruises, some of them as large as two hands. They began to fade, and after three weeks she had no fresh ones. No mucous membrane bleeding developed, except a very small amount in the mouth on the second day after admission. In three weeks she was up in a chair, and shortly after permitted to walk around and was discharged in good condition thirty-four days after onset, there being no new areas of hemorrhage and

all old ones having faded. Her platelet-counts varied between 30,000 and 90,000. At present she is well and has no signs of any purpura. Her blood-picture at this writing is: Platelets, 245,000; blood-clot retracts in a normal manner.

She is a case in which spontaneous remission occurred. This is not infrequently the case. It cannot be foretold whether she will develop a recurrence of symptoms. I think she probably will. She had no treatment directed at the condition, but was given simple symptomatic therapy to relieve headaches and constipation.

Case V.—Has already been reported by Cohn and Lemann in a former communication. It was that of a boy of five, with no history of familial bleeding and no previous illnesses relating to purpura.

Purpura was present intermittently for three months. A transfusion was given which apparently controlled the condition for three weeks. After four weeks a second transfusion was necessary, but was not of very marked benefit. A third transfusion, ten days later, influenced the bleeding very little, and a fourth was given. By this time it was realized that splenectomy was indicated. It was done about three months after the onset of the illness. The patient has had no recurrence and is in fine health at present, over three years having elapsed. The blood at the time showed a moderate secondary type of anemia with normal coagulation time and bleeding time of five minutes. Platelets were not counted, but noted to be few in smears. Later counts after splenectomy ranged between 145,000 and 400,000.

Comments.—He was a case of the chronic recurrent type, not controlled permanently by transfusions, cured by splenectomy.

SUMMARY

1. Cases of purpura hæmorrhagica associated with low platelet-count, normal coagulation time, prolonged bleeding time, and failure of clot to retract should be classed as thrombocytopenic or thrombocytolytic types of purpura.

2. The etiology and pathology of this condition is unknown. Infection may be a factor.

3. Lack of complete knowledge of the details governing blood coagulation, and the direct relation of platelets thereto, makes the disease still obscure.

4. Methods of counting platelets show variable results. Comparable counts should be made by the same method.

5. The acute type with severe uncontrollable bleeding is malignant and rarely controlled by splenectomy, because it is believed that the entire reticulo-endothelial system is at fault.

6. Chronic recurrent types are serious, but frequently curable by splenectomy, seemingly because only the splenic part of the reticulo-endothelial system is at fault.

7. Transfusions are indicated to raise the platelet-count and control bleeding and anemia, if possible, before operation.

8. All cases of mild purpura should have laboratory studies of coagulation time, bleeding time, platelet-count, and observation of retractile character of blood-clot.

BIBLIOGRAPHY

Duke, W. W.: Pathogenesis of Purpura Hemorrhagica with Special Reference to the part played by Blood-platelets, Arch. Int. Med., 1912, x, 445.

Duke, W. W.: Causes of Variation in Platelet-count, Jour. Amer. Med. Assoc., 1915, lxv, 1600.

Kaznelson, Paul: Wein. Klin. Wchnschr. (Trans.), 1916, xxix, 1451.

Minot, G. R.: Diminished Blood-platelets and Marrow Insufficiency, Arch. Int. Med., 1917, xix, 1062.

Cohn, I., and Lemann, I. I.: Surg. Gyn., and Obst., 1924, xxxviii, 596.

Christian, H. A.: Purpura and Allied Conditions, Oxford Medicine.

Whipple, A. O.: Surg., Gyn., and Obst., 1926, xlii, 329.

Whipple, A. O.: Chaille Memorial Address at Tulane University, 1926.

Macleod: Physiology and Biochemistry in Modern Medicine.

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PURPURA AS A CARDIOLOGIC PROBLEM

(Associated Conditions, Illustrative Cases, Significance, Differential Diagnosis, and Treatment.)

PURPURA is a symptom, of widely diverse causation, which brings the patient to the cardiac clinic about as often as it does to the hematologic clinic. The chief reason for this is perhaps the general tendency to think first of embolism from vegetations on heart valves, which is the simplest, most readily, and clearly understood cause of intradermal hemorrhage. Furthermore, individuals with the tendency to cutaneous hemorrhages very frequently present shortness of breath, palpitation, and edema as complaints of the first order. Then, too, the common finding in cases of purpura of a functional, hemic, or anemic systolic murmur at the cardiac apex, and the presence of fever, taken together with a petechial skin rash certainly often suggest strongly the possibility of an endocarditis. Furthermore, acute visceral symptoms considered infarctions, enlarged spleen and evidences of renal irritation, and arthritic manifestations of the hemorrhagic diseases add to the ambiguity of the symptom complex.

It is my object to emphasize the similarity of manifestations in these two types of diseases, to cite cases of heart disease with the purpuric symptoms, and, also, cases of the various hemorrhagic diseases which presented symptoms and signs suggestive of cardiac involvement.

A consideration, even though brief, of the whole hemorrhagic group, with especial emphasis on the purpuric phenomena

that occur in various types of heart disease, is, to be sure, a correlation study of clinical value. The differential diagnostic criteria, with illustrative cases, and the notes concerning treatment should prove interesting and instructive. Hemorrhagic diseases lend themselves fairly well to the classification based on the simple clinical observations and such simple tests as the platelet-count, the bleeding time, the coagulation time, and the character of the clot.

Cardiac affections, often accompanied by cutaneous hemorrhages, fall into two principle groups:

The *infectious embolic group* comprises cases of acute and subacute infections on the heart-valve leaflets or the endocardium. In these cases of endocarditis the purpura is the result of emboli into the skin capillaries.

The *congestive thrombotic group* consists of cases of myocardial insufficiency in which venous stasis, anoxemia, and increased pressure in the skin capillaries of the extremities seems to be a causative factor. Occasionally an acute cardiac failure results in thrombosis, especially in the pulmonary circuit. These small thrombi later may give off emboli which, lodging in the skin, produce minute anemic infarctions which promptly become hemorrhagic.

Hemorrhagic diseases may likewise be divided into two chief groups:

Primary purpura, the hemorrhagic diathesis, *visceral purpura* (Henoch's), with repeated epistaxis or hematuria, simulates and may be simulated by hypertension or endocarditis. Arthritic purpura (Schönlein's) with a sore throat, fever, swollen, painful joints, and relapses is at times confused with rheumatic fever and evidences of cardiac damage suspected. Thrombocytopenic purpura (hemorrhagic, idiopathic) with fever, joint pains, epistaxis, hematuria, rapid anemia, and accompanying symptoms is suggestive of endocarditis.

Secondary purpura, the symptomatic manifestation, has as one of its chief subgroups *septic purpura,* which is a common manifestation of bacterial endocarditis as well as of septicemia and pyemia. The venous stasis of congestive heart-failure may

at times result in extensive *mechanical purpura* of the affected parts. Specific infectious diseases, acute blood diseases, acute leukemia, severe jaundice and poisons, such as snake venom and drugs, at times produce capillary endothelial damage, cutaneous hemorrhages, and sometimes accompanying symptoms that suggest myocardial insufficiency. Deficiency diseases, hemophilia and scurvy, may present associated symptoms that suggest heart damage. Chronic wasting diseases may present purpura and at the same time symptoms of cardiac disease.

CASE I. REPEATED CROPS OF EMBOLIC PURPURIC SKIN LESIONS IN A PATIENT WITH SUBACUTE BACTERIAL STREPTOCOCCUS VIRIDANS ENDOCARDITIS

R. A., an electric crane operator, aged twenty-three, came into the Charity Hospital on the Tulane University Service of Professor John H. Musser, because of pain in the abdomen, a red rash, and weakness. The *present illness* had begun insidiously about six weeks previous to admission when, following a mild respiratory infection, he noted malaise, weakness, a cough, occasional chills and night-sweats, and loss of weight. He had been sent, because of these symptoms, to a tuberculosis sanitorium, from which after a two weeks' sojourn he was discharged as nontuberculous. In the week preceding his coming to our clinic he had had a sudden attack of severe, sharp pain in the left upper abdomen. The following day the skin lesions appeared. The symptoms all persisted and increased in severity.

His *past history* was interesting in that following a tonsillectomy eight years previously he had suffered eight hemorrhages and had noticed extreme blueness of his legs, but his condition was such at that time that he had made no further observations. He had had no sore throat nor any acute infectious disease except measles. He had had no venereal diseases.

The *physical examination* revealed a young white male of asthenic habitus, decidedly under weight. The skin, especially over the chest and abdomen and extremities, was studded with petechial hemorrhagic lesions with white or yellowish centers

(Fig. 97). The lesions were pin-head sized, and, for the most part, circular, but occasionally crescentric in shape. The conjunctiva of the left lower lid also presented minute hemorrhagic infarcts. The skin had the peculiar brownish-yellow tinge along with the pallor. The conjunctival and mucous membranes were pale except for the occasional petechial spots (Fig. 98).

The vessels of the neck pulsated actively. The heart apex-beat was visible and palpable in the sixth left intercostal space

Fig. 97.—Case I. A photograph of the skin in the loose folds of the right axilla, a common site for skin embolic phenomena. The purpuric areas shown were frequently crescentric and when circular presented light yellow centers. The lesions are typical of skin embolism of subacute bacterial Streptococcus viridans endocarditis.

10 centimeters to the left of the midsternal line. Abnormally active pulsation, wavy in character, was noted in each left interspace from the second to the sixth in the parasternal line. Systolic and diastolic thrills and shocks were felt over the precordium. The outline of cardiac dulness had no characteristic form, but indicated enlargement of the heart (by teleoroentgenogram the transverse diameter was 17.2 cm.; the aortic hemicircle, 3.4 cm.), and suggested with the other findings a congenital

lesion. Auscultation revealed a predominating systolic murmur, which varied some in character in various areas of the precordium. A short, rumbling, diastolic murmur was present at the apex, and a soft, blowing diastolic murmur was heard in the pulmonary area. The pulmonary second sound was accentuated. The pulse rate persisted above 100.

The lungs were negative. The abdomen was soft. The edges of the liver and spleen were just palpable, but neither edge was tender. An irregular septic fever was always present.

Fig. 98.—Case I. A photograph of the face of the patient with the subacute bacterial Streptococcus viridans endocarditis, showing the common and characteristic embolic hemorrhagic infarction of the conjunctiva.

The *laboratory examinations* brought forth significant and conclusive data. There was a grave secondary anemia, a moderate polymorphonuclear leukocytosis, an albuminuria and cylindruria with a microscopic hematuria. The Wassermann was negative. The bleeding time, coagulation time, and platelet count were normal. Blood cultures studied by Dr. H. J. Gondolf showed over 200 colonies of Streptococcus viridans per cubic centimeter of the patient's blood. The blood cultures remained

persistently positive. After about a month the patient suffered an attack of bloody diarrhea. The stools were found to contain cysts and vegetative forms of Endameba histolytica. The prompt administration of an iodoxyaninolin-sulphuric acid (Anayodin) preparation cleared up the dysentery in its usual spectacular manner.

The patient continued to have crops of petechial hemorrhages. The intravenous injection of 50 c.c. doses of 1 per cent. gentian-violet seemed to be of no avail and, in fact, the injection seemed to precipitate and make more severe the showers of emboli from the vegetation. The heart murmurs and sounds changed character from time to time.

Thrombosis of the arm veins with some necrosis of the surrounding tissues resulted from the extravasation of the gentian-violet solution. A cerebral embolism resulted in a hemiplegia. The sepsis continued, and the patient finally died about two months after admission, that is, four months after the onset of his trouble.

The *autopsy*, performed by Dr. George H. Hauser, revealed an extensive thrombotic vegetative endocarditis of the mitral valve, pericardial effusion, infarction of the spleen and kidneys, edema and congestion of the lungs, toxic myocarditis, and hepatitis.

Discussion.—This case of secondary purpura, of a septic endocarditis origin, presented little difficulty in the determination of the etiologic factor. The interesting and important diagnostic facts which this case protrayed so strikingly were the yellowish-white centers of the purpuric areas, and the occasional characteristic crescentric form of the hemorrhage which Libman has commented upon. All of the cardinal requirements for the diagnosis of an endocarditis and more specifically of a subacute bacterial Streptococcus viridans endocarditis, namely, evidence of a vegetative valvulitis (a diastolic murmur), sepsis (chills, leukocytosis, fever, and anemia), embolism (kidney hematuria, skin, and conjunctival petechial, spleen enlargement), and a repeatedly positive blood culture were present.

CASE II. HEMORRHAGIC SKIN EMBOLISM FROM EXTENSIVE POSTPARTUM PULMONARY THROMBOSIS AND CARDIAC FAILURE BEGINNING IN THE LATER MONTHS OF PREGNANCY

S. H., a young housewife, was brought to the hospital because of swelling of the legs and shortness of breath. She was in the seventh month of her first pregnancy. The *presenting symptoms* had appeared more or less insidiously within a week of admission, and had continued to progress gradually, but definitely. She went into an exhausting labor, and, in spite of extreme dyspnea and orthopnea and weakness, was delivered of a premature child, which died after a few days. The delivery was accomplished with very little mechanical or obstetric difficulty, but the patient reacted poorly, and never recovered from the effects of the strain on her heart. Her respiratory distress increased very definitely, a paroxysmal cough became very troublesome, and within a week she began to expectorate much dark blood. A few days later sharp pleuritic pains developed in the left axilla and base, posteriorly. An irregular fever, slightly septic in type, ranging from 99° to 103° F., was present and occasional chills were noted. Diffuse petechial and purpuric ecchymoses developed over the trunk and extremities. The small, hemorrhagic, septic skin-lesions had yellowish centers, and were unquestionably embolic in nature. The cyanosis increased and the signs of heart-failure progressed rapidly, until the degree of edema and congestion was extreme.

The *past history* had been negative as to etiologic factors or relevant conditions.

The *physical examination* revealed, besides the visible evidences of congestive heart-failure and purpura, also a definite pallor along with the cyanosis. The neck veins were somewhat engorged.

The apex impulse was diffuse, wavy, and with apparently very little vigor to it. It was in the fourth and fifth interspaces, and extended almost to the anterior axillary line. No thrills or shocks were palpable. The cardiac dulness as outlined by percussion was roughly globular in shape. The heart area was definitely enlarged. On auscultation a most striking presystolic

gallop rhythm was conspicuous, and the heart-rate averaged about 120 beats per minute. Slight blowing, systolic murmurs were heard in the tricuspid and mitral areas. The second pulmonic sound was accentuated. The pulse was small, thready, and running rapidly. The blood-pressure was 85 mm. of mercury, systolic, and 60 mm., diastolic.

The respirations were short, quick, and shallow. The chest expansion was little. Vocal fremitus was increased, especially at the posterior lung bases. No friction was palpable. The percussion note was definitely impaired over the lower lobes. The breath sounds were bronchovesicular to bronchial in character, and accompanied by fine crepitant râles of pulmonary edema over the parts of the lung that were dull to percussion.

The abdomen was distended and a soft, boggy liver was palpable, extending down a hand's breadth below the costal margin. The spleen was not palpably enlarged.

The *laboratory examinations* revealed large amounts, up to 5 per cent., of moist albumin in the urine with only an occasional hyaline cast, leukocyte, and red blood-cell. The excretion of phenolsulphonephthalein was 55 per cent. in two hours, and the blood chemical examinations gave fairly normal values, namely, non-protein nitrogen, 30 mg.; creatinin, 1.5 mg.; and uric acid, 3.5 mg. per 100 c.c. of blood.

There was a definite secondary anemia, and a moderate polymorphonuclear leukocytosis. The Wassermann was negative, and repeated blood-cultures showed no growth after a week's incubation. The sputum contained blood-cells, but was negative for tuberculosis.

The patient continued to lose ground rapidly, and died four weeks after she was delivered.

The *autopsy* revealed multiple thromboses and infarctions in the lungs, with some bronchopneumonia. The heart was dilated, but very slightly, if at all hypertrophied, for it weighed but 300 gm. The muscle was pale and friable. Petechiæ were present beneath the epicardium. The valve leaflets were normal, but a relative tricuspid insufficiency was demonstrable. Microscopically, there was seen considerable increase in subepicardial adipose

tissue. The heart-muscle cells showed cloudy swelling, fragmentation, and mononuclear infiltration. There was beginning fibroblastic infiltration of the myocardium. The kidneys together weighed 300 gm., and showed congestion and microscopic necrosis, swollen granular tubular epithelium, and scar tissue encroachment upon some glomeruli.

Discussion.—The embolic purpura in this patient, with fever and heart murmurs, even though only presenting evidences of cardiac enlargement and failure coming on in the later months of pregnancy, was enough to establish a diagnosis of heart disease. The absence of any previous evidence of heart trouble preceding the acute failure in the later months of pregnancy, and the fever, tachycardia, and great prostration suggested an endocarditis. The development of the purpuric spots and the pulmonary signs were taken as corroborate evidence of an endocarditis or a cardiac, mural thrombosis. The hemorrhagic areas with anemic centers were definitely embolic. The source of the emboli must have been the thrombi in the pulmonary veins as no other possible sources were evident. The heart valves were smooth and the entire endocardium was free from mural thrombi. The purpura is one of mechanical or embolic origin. The case is, thus, one of unusual interest in pointing out a not uncommon cycle of events late in pregnancy. I have seen two other cases of the condition, one of whom died, while a younger one recovered in spite of a very stormy course.

CASE III. ACUTE CARDIAC FAILURE WITH PETECHIÆ, ECCHYMOSES, AND SEPTIC INFARCTS IN THE SKIN, FOLLOWING A TRANSFUSION IN A PATIENT WITH AN ACUTE EXACERBATION OF A CHRONIC RHEUMATIC VALVULITIS

N. M., a domestic, aged sixteen, was brought into the hospital because of an incapacitating shortness of breath and precordial distress and pain.

Her *present illness* actually dated back eight years when, at the age of eight, she had her first attack of "inflammatory rheumatism." This infection confined her to bed for several

weeks, and was accompanied by some palpitation and shortness of breath. She had had mild attacks of tonsillitis before this, and was not able to go to school after this because of chorea. At the age of ten the chorea was so severe that the patient was unable to co-ordinate her movements sufficiently to feed herself. The chorea persisted until the age of thirteen, when it was arrested, and never did reappear.

The patient was apparently free from any significant trouble for three years, when at the age of sixteen, six months before admission, she suffered a recurrence of her acute joint trouble with fever, much pain, and swelling in the parts. She went to bed for two weeks, and was able only to sit up and move about a bit for four weeks more. She went back to work after about two months, but within two weeks after her return her acute rheumatic fever recurred and persisted with fever, pain, and swelling in the knees, loss of appetite, weakness, cough, dyspnea, and severe pains in the precordial region.

An irregular fever of 99° to 103° F., and a high pulse rate averaging 120 were present, Because of a severe secondary anemia, a transfusion of 400 c.c. of citrated blood taken from a chronic nephritic patient of Group IV was given to the patient whose blood was of the Group II type. An unusually alarming reaction followed with a heavy chill, a sharp rise in fever to 105° F., and a rapidly increasing dyspnea and cyanosis. The cough became most aggravating and productive with frothy, bloody sputum in considerable amount. Diffuse petechiæ and ecchymoses with small, septic, undoubtedly embolic skin lesions appeared over the arms and the left side of the body.

The *physical examination* showed a pale, thin, cyanotic girl, dyspneic even at rest and expectorating blood. Beads of cold perspiration were present on the forehead. The cervical glands were visibly enlarged. The skin of the arms, left side of the trunk, and the right thigh presented unquestionable evidence of embolism with petechial hemorrhages, ecchymotic areas, and small septic infarctions.

The percussion of the chest revealed dulness in the right axilla and back. On auscultation over this area distant bron-

chial breathing and crepitant râles were heard, suggesting pulmonary infarction and edema.

The heart apex was visible and palpable 1 cm. outside the left midclavicular line, and the area of cardiac dulness extended 4 cm. to the right and 11 cm. to the left of the midsternal line, thus indicating definite cardiac enlargement. A blowing systolic murmur and a rumbling diastolic of mitral stenosis were heard in the mitral area, and a soft blowing diastolic murmur of aortic regurgitation was elicited in the second right intercostal space. A superficial, scratching sound—a pericardial rub—was audible over the lower sternum.

The pulse was quick and poorly sustained, a true water-hammer or Corrigan type. A Traube's pistol-shot reduplicating sound and Duroziez's diastolic murmur were heard in the compressed femoral artery. The blood-pressure was 108/45 in the arm, and 130/45 in the leg.

The abdomen was somewhat distended. There was tenderness on palpation in the region of the spleen.

After the transfusion the patient became anasarcous, the eyelids and the face became swollen and puffy, and the subcutaneous tissue, especially of the extremities and ankles, became edematous and waterlogged. Ecchymoses developed beneath the eyes, along with the generalized petechial rash. The liver rapidly enlarged, extending 6 cm. below the costal margin and becoming very tender. The symptoms and signs of acute cardiac failure progressed rapidly until the degree of congestion and edema was extreme. There was a change in the character of the heart murmurs. The aortic diastolic murmur seemed to be intensified and more widely transmitted. A tricuspid systolic murmur developed. The scratch over the precordium along the lower left sternal border became a loud, rough, grating to and fro, palpable friction rub. Dulness and bronchial breathing with fine crepitant râles were found at the bases of the lungs posteriorly. Hemopytsis became quite alarming. The temperature ranged from a subnormal level of 97° to a fever, 102° F.

The *laboratory examinations* showed a high grade of secondary anemia and a leukocytosis. The bleeding time, clotting time,

and platelet counts were normal. Blood-cultures were negative and the Wassermann was negative. The urine was negative at first, but after the transfusion the output dropped to 100 c.c. per twenty-four hours, and showed albumin, casts, and red blood-cells. The blood non-protein nitrogen was 47.6 mg. per 100 c.c.

The patient died suddenly while straining on a bed-pan. The *autopsy* showed a chronic rheumatic valvulitis of the aortic mitral and tricuspid valves with, besides the old scars, rows of bead-like, partially subendocardial vegetations with very little, if any, fibrin deposit or thrombotic masses; lesions similar to those found in acute exacerbation of a chronic, rheumatic endocarditis; chronic and acute pericarditis; cardiac hypertrophy, and great dilatation with considerable tricuspid insufficiency; pulmonary thrombosis with edema and atelectasis of the left lung; bilateral hydrothorax, ascites, anasarca, and passive congestion of the viscera. Cultures of the heart-blood and the vegetations were sterile. The skin lesions were embolic, and secondarily infected. The kidneys were acutely congested and hemorrhagic.

Discussion.—Acute cardiac failure following transfusion, with pulmonary thrombosis and embolic skin lesions with surrounding purpura in a patient with an acute exacerbation and chronic rheumatic endocarditis are all of unusual interest. The disturbance was, apparently, primarily cardiac in origin, and, most likely, an acute dilatation and failure of the already damaged heart the result of the transfusion. The thrombosis in the pulmonary vessels being the result of stasis from the acute, passive congestion of the acute failure added to the chronic passive congestion of the mitral stenosis. The pulmonary thrombi were most probably the source of the skin emboli. Another possibility is that the reaction of the Group II patient to a Group IV donor's blood was in the nature of an agglutination and a resulting anaphylactic shock, which is now considered by some investigators to be due to minute emboli of fibrin. Another theory might be mentioned to account for the reaction and that is the possibility of the presence in the chronic nephritic donor's blood of

some toxic substance, which was sufficient to cause an acute renal lesion with suppression of the urine, increased blood-pressure, and an acute failure of the heart under this added burden.

CASE IV. WIDE-SPREAD PURPURIC RASH IN THE SKIN OF THE EXTREMITIES, ESPECIALLY THE LEGS, IN A PATIENT WITH CHRONIC CONGESTIVE HEART-FAILURE

D. P. S., a painter, aged sixty-three, was brought into the hospital with an extensive purpura, especially of the lower extremities, and waterlogging of the lower half of the body, complaining of asthma-like shortness of breath. The *presenting trouble* had had its onset, so far as the patient knew, only five months previously when, through exposure to cold and dampness and overwork, he had contracted a severe "chest cold" and most probably an extensive capillary bronchitis or bronchopneumonia. During the course of this acute respiratory infection he first noted his shortness of breath and an occasional sharp pain over the heart. He never fully recovered from the effects of the bronchial infection on his heart. Insomnia and nocturia had long been troublesome. After a few months of rest he tried to work again, but after one week he had to give up and was not able to return to work. In spite of rest at home he grew progressively worse and for a month before admission he had been completely bed-ridden. He suffered with severe orthopnea, paroxysmal at times, and especially so in the nocturnal exacerbations of smothering attacks of cardiac asthma. Edema had been noted for one week, gradually extending up the legs to the abdomen and lower back. The red rash, which was most alarming to the patient, appeared just two days previous to his entering the hospital.

The *past history* contained few relevant facts. The patient had used alcoholic drinks to excess for years, especially during his later years. He had had gonorrhea as a youth, but denied syphilitic infection by symptom as well as by name. He had had what he termed "blood poisoning" infection in his right arm and hand at the age of fifty-five. The infection cleared up promptly following free incision and the injection of a sulphur solution.

He had been married for forty-two years and his wife was living, but in poor health with chronic arthritis and partial blindness. She had one spontaneous miscarriage early in married life, and had never again become pregnant.

The patient's family history was poor in that his mother had died of heart disease at seventy-six; his father and two brothers of chronic alcoholism, and one sister of obesity and mental deterioration.

The *physical examination* revealed an anxious-looking orthopneic patient with a flushed cyanosed face, and distended skin venules over the nose and cheeks. Purpuric spots were noted over the backs of the hands and over the legs. These small, hemorrhagic areas were in parts discrete, in other parts confluent, of varying shades of reddish-brown and yellowish-green color. There were no anemic centers and no other evidences of infarction or of sepsis. Over the lower parts of the legs and feet extensive ecchymoses and subcutaneous effusion of blood had taken place. There was a massive edema of the lower extremities up to the hips and involving the scrotum and penis.

The eye-grounds showed a mild bilateral albuminuric retinitis. The pupils were unequal and reacted sluggishly to light. The lips and oral mucosa were cyanotic. The oral hygiene was abominable, with a severe pyorrhea and many carious teeth.

The neck veins were conspicuously engorged. The chest was barrel-shaped and retracted at the bases. The breathing was of the Cheyne-Stokes type. The percussion note was impaired and râles were present over the lower lobes of both lungs.

The heart was greatly enlarged, the area of cardiac dulness extending 6 cm. to the right and 14 cm. to the left of the midsternal line. The apex impulse was not visible or palpable. The heart-sounds were loud and valvular in character in the mitral area. There was a distinct presystolic gallop rhythm, and a sharply blowing systolic murmur which was widely, but most intensely transmitted toward the axilla. The aortic second sound was distant, but of a liquid metallic quality. Occasional premature contractions were noted. The blood-pressure was 200/120 and dropped to 185/125. The radial and brachial

arteries were tortuous, thickened, sclerosed, and probably slightly calcified.

The abdomen was above the costal margin with a thick panniculus and some evidences of ascites. The liver edge was felt 6 cm. below the rib margin. The liver was not distinctly tender, but it was definitely hard. The spleen was not palpable. The prostate was not enlarged. The right testicle was larger than the left. The abdominal and extremity reflexes were present and active.

The *laboratory examinations* revealed an albuminuria (3 to 8 gm. of moist albumin per liter) with hyaline and granular casts. The specific gravity varied from 1.012 to 1.130 and the twelve-hour day specimen exceeded in volume the night specimen. The output for each twenty-four hours was greater than the intake. The phenolsulphonephthalein excretion was 36 per cent. in two hours. The blood-counts were normal, and the complement-fixation test was negative. The blood chemical studies showed that the non-protein nitrogen was 45 mg.; the uric acid was 5.2 mg. per 100 c.c.; the CO_2 volume per cent. was 51. The platelet count, the bleeding, and the coagulation times were normal.

A teleoroentgenogram of the heart at 2 meters gave these measurements: median right, 7.5 cm.; median left, 11 cm.; longitudinal, 18 cm., and aortic width, 6.5 cm.

The electrocardiograms showed sinus arhythmia and left ventricular predominance, and evidences of myocardial changes. The PR interval was 0.24 to 0.25 sec. with partial block, at times high grade and even complete, with frequent ectopics and later auricular fibrillation.

The course of the disease in the hospital was of only a week's duration. The edema and orthopnea increased. Digitalis produced some diuresis, but the patient became irrational and could not be kept in bed. He fell downstairs and the next morning he was found dead in bed.

The *autopsy* showed innumerable petechiæ in the epicardium and chronic calcified mitral and tricuspid valvular ring scars. Cardiac hypertrophy, with microscopic cellular infiltration and

degeneration or necrosis and cloudy swelling of the myocardium, and an increase in connective tissue throughout, a thickening of the endocardium, general anasarca, chronic passive congestion, enlargement of the kidneys and the spleen as well as of the liver, pleurisy, chronic diffuse nephritis, perisplenitis, and lipomatosis of the pancreas were present.

Discussion.—The purpura in this case was definitely of the mechanical type, secondary to the stasis incident to the extreme degree of congestive heart-failure. Beside the stasis there was also an accompanying anoxemia, which might well have induced degenerative changes in the capillary endothelium. The vessel walls must in some such manner have been weakened to allow the extravasation of blood, for the occurrence of purpura in congestive heart-failure is by no means common. It is the exception rather than the rule. Other hemorrhagic diseases, notably scurvy, give similar evidence of weakened capillary walls to account for the ecchymoses. The resistance of the capillaries can be tested with a blood-pressure cuff, inflated to just above the diastolic pressure and maintained at this pressure for three minutes. If the capillary walls are weakened, this maneuver will produce petechiæ. The possibility of anoxemia and toxins damaging the capillary walls and weakening them, in some cases of congestive heart-failure, may account for the occurrence of secondary purpura in some of these cases, and not in the majority of patients with cardiac decompensation.

CASE V. ARTHRITIC PURPURA IN A PATIENT WITH A HISTORY OF TONSILLITIS AND ACUTE RHEUMATIC FEVER AND WITH AN ACUTE EXACERBATION OF THE ARTHRITIS, FEVER, EDEMA, AND HEMATURIA

M. C., a blind pig look-out, aged thirty-six, came into the hospital because of swelling of his ankles, pains, and stiffness of joints, and purple spots on the skin. The *presenting trouble* had begun about a week previously as he was just recovering from an attack of what appeared to be influenza, when he noticed small purple spots in the skin about his right ankle. These spots appeared on the left ankle within twelve hours. The next day the ankles were swollen, painful, and hot to the touch. The teeth and

gums also became sore about this same time. A gradually increasing shortness of breath had been experienced on walking.

In the past he had had tonsillitis frequently, with severe attacks at the ages of sixteen, seventeen, and eighteen. With the last attack he had severe joint involvement which suggested rheumatic fever. He had had an acute attack of gonorrhea which was followed by an arthritis and a chancroid infection without complications in the same year.

The *physical examination* showed purpuric spots about both ankles, swelling, redness, and heat about the ankle-joints, the right elbow, and the left knee. The lesions were not definitely localized to hair-follicles as in scurvy. The conjunctivæ were injected. The left pupil was irregular, but both reacted normally to light. There was considerable nystagmus on looking to the right. Tenderness was present on pressure of the right maxillary sinus. The teeth were in very poor condition. Oral hygiene was very poor. Some of the teeth were necrotic to the very gum edge. The gums bled easily on pressure. The tonsils were enlarged and inflamed and a bloody mucous discharge was present in the nasopharynx. The heart was normal in size. A systolic murmur was present in the aortic area, but no diastolic murmur could be heard. The aortic second sound was accentuated. The heart was distinctly overactive. The lungs were negative. The abdomen was negative. The liver and spleen were not palpable. Fever was present most of the time during the first two weeks of the patient's stay in the hospital.

The *laboratory examination* on admission showed that the blood was normal except for slight leukocytosis, but, as the infection progressed, a rather severe secondary anemia developed and the leukocyte count increased. Blood-cultures were persistently negative. The fragility test was normal. The blood-platelet count was 336,000. The bleeding time and coagulation time were normal, three and three and a half minutes, respectively. The urine showed a trace of albumin, hyaline and granular casts, epithelial cells, leukocytes, and red blood-cells in the sediment. The phenolsulphonephthalein excretion was 60 per cent. in two hours. Stools and sputum were negative.

The patient began to improve after about three days in the hospital; he then had a relapse, another crop of purpuric spots appeared about the ankles, and a definite edema was also present. Increasing dyspnea and palpitation were noted during the relapse. An area of acute tenderness developed over the right tibia, but, on rest in bed on a high vitamin diet and phenylcinchoninic acid preparations along with the ordinary antirheumatic drugs, the symptoms cleared up entirely.

Discussion.—The past history of tonsillitis and acute rheumatic fever in youth, with an exacerbation of joint symptoms accompanied by purpura and edema and some shortness of breath, were suggestive of rheumatic fever with possible rheumatic involvement of the heart. The absence of diastolic murmurs and persistently negative blood-culture made the diagnosis of active endocarditis untenable in spite of the hematuria. There were abundant foci of infection in the teeth, tonsils, sinuses, and prostate gland which might well account for an acute exacerbation of a chronic infectious arthritis accompanied by a purpura, the so-called purpura or peliosis rheumatica or Schoenlein's disease. The gingivitis, of course, was strongly suggestive of scurvy, as were also the suggestive pretibial periosteal elevation and the prompt recovery on a high vitamin diet. The laboratory findings, especially the normal platelet count, bleeding and coagulation time, were compatible with either diagnosis. Arthritic purpura seems to be the most plausible, and its prompt clearing up might be easily accounted for as a result of the use of cinchophen.

CASE VI. SYMPTOMS AND SIGNS SUGGESTIVE OF A POSSIBLE ENDOCARDITIS IN A PATIENT WITH AN ARTHRITIC PURPURA AND A CAROTINEMIA, AND POSSIBLE SCURVY, FROM THE INGESTION OF A MONOTONOUS DIET OF ONLY RAW EGGS (48 PER DAY) AND BREAD FOR A YEAR OR MORE

S. L. F., a watchman, aged thirty-four, came to the hospital because of a tight feeling over the heart, palpitation on exertion, a hemorrhagic rash over the legs and arms, with aching pains, swelling and soreness in the knees and ankles, and a yellowish discoloration of the body, fever, and indigestion.

The *presenting symptoms* had been in existence for only a week, but the gastro-intestinal trouble which seemed to be the forerunner of his present illness, had had an insidious onset three years previously when a chronic constipation and cathartic habit of ten years' standing began to require more drastically acting purgatives. In January, 1925 he began limiting his diet to oatmeal and raw eggs. About two months later he was given a course of six injections of arsenic, and he improved and his constipation was relieved on an ordinary diet. His physician then advised a diet of bread and 6, which he gradually increased to 48, raw eggs a day. He held rigorously to this diet for thirteen months up until the time of admission. His bowels moved three to five times daily. He had had a severe remitting, supposedly non-specific, urethritis for more than three years.

For ten days before admission he had suffered with soreness and swelling of the legs, with the appearance of red spots in the skin over the lower tibia, whence there was a spread to the popliteal space, thighs, arms, and trunk. The areas on the lower legs rapidly increased in size and prominence. At about the same time the yellowish discoloration of the body was first noticed, but may have been present unnoticed for some time. His gums had been sore and had bled with the slightest trauma for about two years. His tongue had been sore. Attacks of epistaxis had been frequent and prolonged for two years. He had had a great deal of eructation of gas, and had passed much foul-smelling flatus. A feeling of precordial tightness and distress, with palpitation and dyspnea on exertion, had been present for some time.

In the past he had had chickenpox, mumps, whooping-cough, and measles in childhood, and between the ages of nine and twelve recurrent attacks of malaria each fall. After this he had had palpitation and dyspnea on working. He had had influenza in 1918, which was followed in ten days by pneumonia for five weeks. He had never used alcoholic stimulants or tobacco.

The *physical examination* revealed a low grade fever, 99° F., a slow pulse, 60, and a respiration rate of 18 per minute.

The skin was yellowish, but the scleræ were not jaundiced and only faintly icteric. The pigmentation of the hands was deep yellow, distinctly more intense than elsewhere on the body. Purpuric spots, ecchymoses, and subcutaneous hemorrhages were present in the skin of the extremities, especially in the regions of the great joints, but these were not definitely confined to the regions surrounding the hair-follicles.

The gums were retracted, sensitive, and bled freely after slight trauma.

The lungs were negative. The heart apex impulse was in the normal position. There was no evidence of enlargement. Only a faint systolic murmur was heard over the apex. The blood-pressure was 122/72.

The liver seemed slightly enlarged to percussion, but no edge could be made out. The spleen was also enlarged and the edge was palpable. Hemorrhoidal loops protruded from the anal sphincter.

The legs were swollen as high up as the hip, but did not pit on pressure. Over the left tibia there was a 12 x 4 cm. area of subcutaneous hemorrhage and brawny induration, surrounded by petechial spots. In the popliteal space there was a similar extravasation that extended up to the middle of the thigh, posteriorly. The skin of the extremities was deeply jaundiced.

The *laboratory examinations* revealed a normal urine, but a high grade, secondary anemia (3.100,000 red blood-cells and 50 per cent. hemoglobin), and a leukopenia (4000 a blood-cell). The platelets numbered 240,000 per c.mm. The Van den Bergh test of the blood-serum for bile-pigment with Ehrlich's diazo-sulphanilic acid and sodium nitrite test was negative in both phases. The icterus index was fifteen times normal with the Meulengracht Standard, indicating an excess of some yellow chromogen which was evidently not of biliary origin.[1] The bleeding time of four minutes and the coagulation time of six minutes were both normal. The fragility test showed hemolysis beginning at 0.44 and ending at 0.34.

Discussion.—The heart symptoms were rather moderate, but

[1] Brought to my attention by Dr. R. C. Pigford.

the presence of a low grade fever, a yellowish discoloration of the skin, petechial hemorrhages, and ecchymoses, arthritis, a mitral systolic murmur, an enlarged spleen, a history of a protracted urethritis taken together suggested endocarditis as a possibility. The normal bleeding time, coagulation time, and platelet count suggested simple purpura, arthritic purpura, or scurvy as possibilities. It is interesting to note that the patient had a carotinemia (15 x normal icterus index), a yellowish pigmentation of the skin, but no reactions for bile-pigments (urine negative and diazo direct and indirect negative in the serum) in the serum. The ingestion of raw eggs, 48 per day for at least 300 days, a total of 14,000 or more, might well have supplied enough of the yellow pigment from the yolks to account for the findings. Then, too, this monotonous diet of raw eggs and bread was sufficiently low in water-soluble, antiscorbutic vitamin C to allow the development of scurvy which would account for the manifestations. The patient's condition rapidly cleared up on a high antiscorbutic diet and rest in bed. The negative reaction of the serum to the second or indirect phase of the diazo-reagent, and the normal fragility figures may be taken as evidence against familial jaundice. The high polymorphonuclear percentage in the leukopenia, as well as the negative indirect diazo reaction in the serum, tends to rule out an early Banti's disease. A focal infection in the prostate with specific or non-specific arthritis and the purpura of infection might be still considered a possibility, but the diagnoses of septicemia and endocarditis were considered practically ruled out.

CASE VII. VISCERAL AND ARTHRITIC PURPURA WITH PAINS, SHARP AND STABBING IN CHARACTER, FEVER, PETECHIÆ, HEART MURMURS, AND HEMATURIA SIMULATING AN ENDOCARDITIS

E. E., a truck driver, aged forty-five, was brought into the hospital complaining of a sharp pain in the abdomen and various joints, and also a rash. The onset of his *present illness* had been acute. A sharp pain in the upper abdomen, slightly to the right, had awakened him from a sound sleep at two o'clock in the

morning of the day of admission. The pain remained localized, steady, sharp, and of about the same intensity, cramping in character, and doubling him up. The pain was less intense when the patient lay on his back, but was eased most by a rolling about on the bed. After about an hour of pain he began to vomit. Food remains and, later, foul smelling, brownish, semifluid material were brought up. No recognizable blood was seen in the vomitus. Practically everything taken by mouth for thirty-six hours was vomited. The pain became paroxysmal, coming on especially intensively after movement, increased in intensity until it became almost unbearable after twenty-four hours, and then gradually subsided. A dull pain or soreness remained in the upper abdomen. The bowels moved regularly. Occasional shooting pains were noted in the joints and in the subdeltoid bursæ. The inner condyle of the right humerus became painful. Petechial hemorrhages appeared on the chest and rapidly all over. Subcutaneous hemorrhagic areas then appeared over all the joints and pressure points. No chills or fever had been noted.

In his *past history* the patient had had all of the various types of venereal diseases, gonorrhea, soft chancre with buboes, and a possible syphilitic infection, a questionable chancre and a secondary rash at the age of twenty-four. At the age of thirty he had had an attack of sharp pain in the back that doubled him up, and this was followed by jaundice. He was a chronic alcoholic. A month before the onset of his acute present illness he had been struck on the top of the head with a blunt club. Erysipelas had developed in the lesion, his hair had fallen out, and an aching soreness was noted in the bones and joints. He had lost 20 pounds in weight within a year and had felt generally below par. His family and marital histories were irrelevant.

The *physical examination* revealed pallor, petechiæ in the conjunctivæ and mucous membranes, and some ulcerations in the mouth. The gums were hemorrhagic and exuded pus on pressure. Petechiæ were present everywhere in the skin, the generalization became very rapid and, later, ecchymoses and subcutaneous hemorrhages appeared about the joints and over pressure points. The temperature was 99.8° F.

The respiration rate was 24 per minute, regular and normal with free symmetric movement of the chest. The lungs were resonant and clear throughout.

The pulse was regular, but increased in rate to 130 per minute. The cardiac apex impulse was in the fifth left intercostal space just inside the midclavicular line. Percussion likewise failed to reveal any cardiac enlargement. Systolic murmurs were heard in the aortic and mitral areas. No friction rub was present. The blood-pressure was 165/90.

The abdomen was held fairly rigid, but could be relaxed. The liver edge extended a finger's breadth below the costal margin and the tip of the spleen was just felt. The extremities showed no edema and very little swelling of the joints.

On the fifth day after admission the patient suffered pain in the chest and a temperature rise to 101° F. The patient became cyanotic. A sloughing ulcer involving the tongue and palate appeared. Examination of the chest revealed the physical signs of consolidation of the whole right lung and the lower lobe of the left lung.

The *laboratory examinations* showed blood in the sputum, vomitus, and stools. The latter had a very foul odor, and contained many trichomonads. The urine contained albumin, red blood-cells, and leukocytes. The blood examinations revealed a leukocytosis of 14,000 to 25,000, and a secondary anemia. Blood-cultures were negative repeatedly. The bleeding time, the clotting time, and the platelet counts were at first all normal, but after the development of the signs of the pneumonia the bleeding time was found increased to ten minutes, the clotting time to three and a quarter minutes, the clot was non-retractile, and the platelets, on one counting, were found reduced to 52,000. The electrocardiograms were slightly atypical.

The patient rapidly became extremely toxic, and died on the seventh day.

The *autopsy* showed, besides the purpura of the skin, mucosa, and the whole intestinal tract: Ulcerations of the duodenum, jejunum, and ileum; thrombosis of the right pulmonary artery, lobar pneumonia on the right, pulmonary edema on the left;

enlargement of the spleen with multiple hemorrhages; localized fibrinopurulent peritonitis. The heart was slightly enlarged, showed many petechiæ over the epicardial surface, and one on the endocardial surface at the top of the interventricular septum on the left, in the region of the origin of the chief branch of His's bundle. The valves were entirely normal.

Discussion.—The symptoms and signs in this case suggested the diagnosis of endocarditis. Acute abdominal pains, the result of embolism, are common even as an early manifestation of endocarditis. The presence of fever, heart murmurs, an enlarged spleen and liver, red blood-cells in the urine, a secondary anemia, and a leukocytosis were strongly suggestive signs. However, the absence of diastolic murmurs, and the persistently negative blood-cultures, as well as the absence of clubbed fingers, pigmentation, and evidences of embolism (yellowish centers) in any of the skin lesions were enough to cast some doubt upon the diagnosis. On the other hand a secondary purpura rather than the more easily visualized embolic purpura might appear in any case of endocarditis, as it may in any other severe acute infection or septicemia. The terminal pneumonia is not a common occurrence in endocarditis, while it is not infrequent in debilitated states from other causes. The blood findings at first were those of a secondary purpura such as one might expect in Henoch's visceral or Schoenlein's arthritic purpura, later on, however, changes were noted which suggested thrombocytopenia which was reported on one count.

CASE VIII. ESSENTIAL THROMBOCYTOPENIA OR IDIOPATHIC PURPURA HEMORRHAGICA FOLLOWING ACUTE, SEPTIC SORE THROAT AND PRESENTING EDEMA, PALPITATION, AND A SYSTOLIC MITRAL MURMUR BESIDES THE RASH

C. K., a school boy of eighteen years, came into the hospital complaining of a wide-spread persistent rash which was reddish-black in color, some fever, some shortness of breath, and palpitation of the heart on slight exertion. Bleeding from the nose and mouth, and slightly blood-tinged urine had also been noted. His *presenting trouble* had begun about five days before he ap-

plied at the hospital for treatment. He noted a few of the reddish-purple spots in the loose skin folds about his axillæ. The spots increased in number, and within twelve hours most of the skin surface presented the rash. It was especially marked below any area where there was pressure. Some bleeding from the mucous membranes of the mouth and nose, and the red discolorization of the urine appeared about eighteen hours after the onset of his trouble. There was little further progress in the lesions after this time. Shortness of breath and palpitation of the heart had been present at the time of the onset of the rash.

It is interesting to note that in his *past history* he had had diphtheria about four years previously, scarlet fever, and septic sore throat shortly after the diphtheria. With the sore throat he had his first attack of the hemorrhagic spots on his body, and he was kept in bed for many months because of a suspected infection of the heart. About the same time the bloody urine was first detected. This was also considered a part of an embolic process. The low grade fever that he had at the time gradually disappeared, and he had no further trouble until the attack that brought him to our attention.

The *physical examination* revealed purple hemorrhagic spots in the skin, varying in size from that of a pin head to that of a dime (the average spot being about 3 mm. in diameter) over almost the entire body. The spots were purple and uniform in color; no central yellow areas were to be found. Pressure upon any part, such as that produced by the blood-pressure cuff, or that of a tourniquet, or even rubbing of the skin with a cloth, caused the prompt appearance of hemorrhagic areas below the point of pressure. The petechiæ were most marked below the elastic supporter line of each calf. The parts directly under the elastic bands were free from eruptions. The mucous membranes of the nose, nasopharynx, and mouth showed some petechiæ and some bleeding. The gums were not spongy and not sensitive. The tonsils were enlarged, partially covered by scar tissue, and apparently chronically inflamed. There was a cervical adenitis. The heart was slightly enlarged. The apex-beat was diffuse, extending for several centimeters inward from just out-

side the midclavicular line in the fifth interspace. The heart was overactive. The left border of dulness extended $10\frac{1}{2}$ cm. to the left and the right, 3 cm. to the right of the midsternal line. The pulmonary second sound was distinctly accentuated, but no other sound changes were noted. A loud blowing systolic murmur was heard in the mitral area, transmitted over the precordium and to the back. No diastolic murmur could be made out. The blood-pressure was 120/75. The lungs were negative. The abdomen was negative. Neither the liver nor the spleen was palpable. The extremities were negative, except for the rash which has been described. No edema was present.

The *laboratory examination* showed a slight secondary anemia, a mild leukocytosis, decrease in the platelet count to 50,000, bleeding time of about fifty minutes, and a coagulation time of about eight minutes. The clot was non-retractile. The blood-culture was negative. Urine at first showed some red blood-cells in the sediment. The excretion of phenolsulphonephthalein was normal. Stools contained occult blood, but were otherwise negative.

The patient improved rapidly. The low grade fever disappeared and the abnormal laboratory findings became normal. The patient received heliotherapy and symptomatic treatment.

Discussion.—With the history of the onset following what was a streptococcus infection, with recurrent attacks and suggestive physical findings, such as the slight degree of cardiac enlargement, murmurs, and a hematuria along with a low grade fever, might well be taken as strongly suggestive of bacterial endocarditis. However, the absence of the central infarcted areas in the purpuric spots; the persistently negative blood-cultures; the absence of diastolic murmurs or changes in character of murmurs; the rapid subsidence of the low grade fever along with the very pathognomonic evidence of purpura hemorrhagica, namely, the distinct decrease in the platelet count, with a prolonged bleeding time, but a normal coagulation time; and the prompt and uneventful recovery under actinic therapy, all make a diagnosis of essential thrombocytopenia or idiopathic purpura hemorrhagica quite certain.

CASE IX. EXTENSIVE HEMOPHILIC HEMARTHROSIS WITH FEVER, TACHYCARDIA, LOUD, WIDELY TRANSMITTED, SYSTOLIC MURMURS, PALLOR, SECONDARY ANEMIA, DYSPNEA, AND PALPITATION STRONGLY SUGGESTING AN ACUTE INFECTIOUS VALVULITIS

De L. G., a school boy, aged fourteen, was brought into the hospital with the complaint of pain and swelling in the right hip, fever, and some shortness of breath.

The *present illness* dated back three days before admission when he crushed his right hip against a board fence. The part immediately began to swell and became increasingly painful, and within an interval of minutes large bluish areas discolored the swollen right hip and thigh. Motion was distinctly limited because of continuous pain. Dislocation of the hip was suspected, but a roentgenogram showed a hematoma in the affected region. The fever, along with an extreme pallor and a tendency to bleeding, and an enlarged, overactive heart with a loud systolic murmur made the surgeons suspect heart disease, for which the patient was referred to the heart unit for observation. He had complained of slight pain in the precordial region, some palpitation and dyspnea on exertion, and attacks of weakness with spots before his eyes during which he became incapacitated.

His *past history* is significant in that he had frequent attacks of tonsillitis with considerable fever for nine consecutive winters, but what is even more important is that ever since he was three months of age his parents noticed that slight trauma produced bluish spots of discoloration on his body. At frequent intervals even without trauma he would have attacks of epistaxis. He has also had frequent attacks of pain and swelling of various parts, especially the knees, ankles, and wrists. Five years before admission he bled constantly from his right ear for three days. Three years before he came under our observation, he scratched his foot on a shell and bled for five days, and two years before his present illness he suffered a collapse. The abdomen became rigid, and he passed blood from the bowels. Extraction of a tooth one month later caused him to bleed for sixteen days.

The *family history* was negative and surprising in that there was no knowledge on the part of any member of the family of any bleeder in the family either on the mother's or father's side. Two brothers died in infancy of unknown causes.

The *physical examination* revealed a rather undersized boy of fourteen years. His skin and mucous membranes were very pale. Respirations were slightly increased in rate. The right hip, the seat of the hematoma, was swollen and the skin discolored bluish-brown with some greenish-yellow along the edges. The swelling extended down the leg, and there was definite edema with pitting in the pretibial tissues as far down as the dorsum of the foot. The area about the hip was tender to touch, and very painful on the slightest movement.

The gums were normal in color and consistency, showed no retraction and no bleeding. The tonsils were inflamed, enlarged, and were filled with exudate, none of which could be extracted on pressure. There was a very definite cervical adenitis. The lungs were negative. Pulsations were rather conspicuous over the precordium, especially over the apex. There were unusual pulsations in the pulmonary area. The apex impulse was diffuse, but rather dynamic. It was located in the fifth interspace, 9 cm. to the left of the midsternal line. Aside from the overactivity, no definite thrills or shocks were left. The heart-sounds were loud and forceful. The pulmonary second sound was distinctly accentuated. A rather loud systolic murmur was heard in the apex, well transmitted to the axilla and back, and over the precordium. A systolic murmur was also present in the pulmonary area. The blood-pressure was recorded as 138 systolic and 53 diastolic, on other occasions 120 and 42.

Electrocardiograms showed a sinus tachycardia, but no other abnormalities. The abdomen was negative. The spleen and liver were not palpable. The extremities showed no abnormalities other than the findings in the right leg as described above. The reflexes were normal. The patient had a fever ranging between 99° and 102° F. For the first three days in the hospital this subsided, except for slight afternoon rises for a week,

and thereafter the temperature was normal except for an occasional slight rise.

Laboratory examinations showed a negative urine; a high grade of secondary anemia; and leukopenia which improved rapidly under hospital treatment; no malaria parasites, and negative typhoid reactions. The platelet count was practically normal at 175,000. The bleeding time was two minutes, fifteen seconds, but the coagulation time was greatly increased for even at an hour and fifteen minutes there was no clotting. After standing in the ice-box over night a retracted clot was formed. The Wassermann was negative. Blood-cultures were negative.

Discussion.—The history of bleeding from childhood from the slightest trauma, and characteristic laboratory findings make the diagnosis of hemophilia practically certain without the confirming family history. The case was evidently a sporadic one. The breathlessness and palpitation were no doubt the result of the severe anemia, but the long history of tonsillitis and questionable arthritis much of which perhaps was due to hemophilic hemarthrosis, the fever which again was probably the result of absorption of the hematoma about the right hip, the cardiac enlargement with tachycardia, the loud, widely transmitted systolic murmur, and the accentuated heart-sounds were suggestive of an infectious endocarditis engrafted upon an old rheumatic lesion. However, the blood-cultures and the subsequent course in which the patient went on to a rapid recovery practically ruled out acute infectious valvulitis. The case serves to show, however, how the picture of a heart infection, with a substantiating history of tonsillitis, and the finding of cardiac murmurs in a patient with hemophilia may simulate heart disease.

CASE X. SPORADIC SCURVY WITH THE NOT INFREQUENT SYMPTOMS OF DYSPNEA, PALPITATION, AND EDEMA WHICH ARE ALWAYS SUGGESTIVE OF MYOCARDIAL INSUFFICIENCY

P. E., a ne'er-do-well, unemployed painter, aged twenty-nine, came into the clinic complaining of swelling and tenderness in the left ankle with much evidence of bruises of the part, and hemorrhagic areas in the skin of both legs, bleeding of the gums,

rather severe pains over the heart, palpitation and dyspnea on exertion, with some edema of the extremities.

The *present illness* or at least the first symptoms of it, rheumatic pains, appeared about seven weeks before he came to the clinic. He felt that he had sprained his left ankle in walking. The pain in the part gradually increased and on examination he found the discoloration about the left ankle which he considered to be an ordinary bruise. Instead of improving, however, the symptoms have gradually increased, and hemorrhagic areas spread widely in the skin of the extremities. On admission the hemorrhagic area about the left ankle was solid, and involved most of the foot and the lower third of the leg. Small purpuric spots of various sizes were present on the toes, legs, and arms. The right ankle was also involved. The patient could hardly bear his weight on his foot. The gums had become tender, hemorrhagic, and spongy about four weeks before he consulted us. His cardiac symptoms had likewise been more or less insidious in onset, and had gradually increased with the increase of his skin and gum manifestations.

His *social history* was distinctly interesting in that he had been unemployed for more than a year, and had been unable to get even odd jobs. During this time his diet has been distinctly limited, consisting of soup, cooked polished rice, boiled red beans, and salt pork. He has had no fresh vegetables. His only beverage has been a poor grade of home brew.

His *past history* was irrelevant. He had had no infectious diseases. He denied venereal diseases. He had never been married.

His *family history* was insignificant. No member of the family was known ever to have had a similar hemorrhagic disease.

The *physical examination* showed a normal temperature, pulse, and respiration. The skin and mucous membranes were pale. The skin of the extremities presented the most interesting findings with large subcutaneous hemorrhagic spots about the left ankle and small ones about the right, and small hemorrhagic areas about the hair-follicles which were, for the most part, about

the size of a lentil. The lesions were of various ages, evidenced by the fact that some were of a yellowish-green, while others were of a reddish-brown color. The skin elsewhere was of a

Fig. 99.—Case X. A photograph of the legs and feet of the patient with sporadic scurvy, showing the purpuric spots and ecchymoses, and the subcutaneous effusion in the region of the left ankle. This latter area is dark and glistening, indicating the hard sclerodermatous infiltration that followed the absorption of blood.

Fig. 100.—Case X. Note especially the mouth of the patient with scurvy, showing the severe gingivitis, the friable, inflamed, bleeding and sensitive gums, and the loose teeth characteristic of the disease.

pasty, sallow color. See reproduced picture of extremities (Fig. 99).

The oral mucosa was purplish-red and showed considerable spongy swelling. There were many carious teeth, considerable

retraction and pyorrheic infection. Many of the teeth were very loose and about to fall out (Fig. 100).

The lungs were negative. The heart: Apex-beat was located 9 cm. to the left of the midsternal line; the impulse was localized and rather forceless; no abnormal thrills or shocks were noted; the cardiac outline was normal in contour, and not enlarged; a faint systolic murmur was heard over the apex. The abdomen was negative, and the liver and spleen were not palpable. Extremities showed the lesions discussed above which varied from pin head size to the size of a dime, the small ones definitely located about the hair-follicles. Reflexes were normal. After the patient's admission to the hospital no new skin lesions appeared. Edema about the feet rapidly disappeared, but a non-pitting scleroderma appeared in the region of the great subcutaneous hemorrhages about the left ankle and foot. The gums rapidly cleared up under moderately high, water-soluble, antiscorbutic vitamin C diet.

The *laboratory examination* showed a moderate anemia with a normal white count, a normal platelet count of about 115,000, slightly prolonged bleeding time of four minutes, and coagulation time of six minutes. The Wassermann was negative.

Discussion.—The patient's cardiac manifestations were again those of the rather high degree of secondary anemia, and are not infrequent in cases of this type. The past history of dietary limitations, especially in regard to vegetables, and the finding of small hemorrhagic areas about the hair-follicles as well as about the joints, and the bleeding, spongy gums and loose teeth, along with the laboratory findings of slightly increased bleeding, coagulation time, and platelet count, all substantiate the diagnosis of scurvy. The rapid recovery after antiscorbutic diet does not completely rule out the possibility of arthritic purpura from the oral sepsis and other possible foci of infection, but makes it rather improbable. The case serves to emphasize the cardiac symptoms that may occur in scurvy, though the cardiac symptoms in this case were unusually mild.

COMMENT

Ten illustrative cases are presented, the first four of heart diseases with purpuric manifestations, the last six of hemorrhagic diseases with cardiac manifestations. The differential diagnosis, therapy, and results are discussed in each instance.

In general, the differential diagnosis of purpura, except for an occasional unclassifiable case, is accomplished with but little difficulty. Cases of heart disease may present purpura as a part of the clinical picture relatively early. Purpura in a mild form may be the first outward manifestation of a subacute bacterial endocarditis, or it may appear in pulmonary venous thrombosis from stasis, phlebitis, or in congestive heart-failure. A purpura may occur at the very onset of a true rheumatic fever infection, especially in young children. On the other hand, pure arthritic purpura is only in rare instances accompanied by evidences of endocarditis. As a rule, however, cardiac cases with purpura present one or more of the classical or accepted signs of heart disease. The primary hemorrhagic diseases, on the other hand, though often presenting suggestive symptoms, show none of the reliable criteria upon which a diagnosis of organic disease of the heart can be absolutely made.

The *classical criteria of heart disease* deserves reiteration. The term "heart disease" should be reserved, absolutely, for cases of actual myocardial damage, which sooner or later will show evidences of cardiac failure. With this conception of the term we can proceed to enumerate the indisputable evidence of organic cardiovascular disease. *Enlargement* of the heart is reliable evidence of myocardial damage. Wide-spread peripheral *arteriosclerosis* is practically always accompanied by coronary sclerosis and consequently nutritive changes in the heart-muscle. *Hypertension*, with a blood pressure persistently above 180 mm. high systolic, invariably affects the myocardium. *Chronic nephritis* and *exophthalmic goiter* sooner or later produce demonstrable injury of the heart-muscle. *Aneurysm* is practically always the result of syphilis, and syphilis usually damages the heart-muscle. *Diastolic aortic murmurs* and *thrills*, the signs of aortic regurgitation, in individuals of middle age signify, as a rule, syphilitic

heart disease, while in young adults the sign is usually evidence of rheumatic heart disease. The *rumbling, apical diastolic murmur* and *thrill* of mitral stenosis spells rheumatic heart disease. Auricular fibrillation and flutter, heart-block, and alternation, *grave disturbances of mechanism*, are found only in association with damaged hearts. The presence of any one of these signs is sufficient grounds for the diagnosis of heart disease, and the absence of each and every one can be accepted as positive proof against the possibility of the presence of heart disease.

The *hemorrhagic diseases* have quite as dogmatic an array of characteristic manifestation, which likewise hold true in a large proportion of cases. *Scurvy* and *purpura simplex* of arthritic or visceral type show *normal* bleeding time, coagulation time, and platelet counts. In *secondary purpura* due to toxins of jaundice, ictero-hemorrhagica, hemorrhagic diphtheria, smallpox, chickenpox, measles, typhus and yellow fever, and poisons, such as chloroform, phosphorus, and dinitrobenzene, the bleeding time and coagulation time are prolonged, while the platelets usually remain *normal* in numbers. *Purpura neonatorum* gives quite similar findings with bleeding time *prolonged*, coagulation time *greatly prolonged*, and platelet count *normal*. *Purpura hemorrhagica*, or essential thrombocytopenia, shows a *greatly prolonged* bleeding time, a *normal* coagulation time, but a nonretractile clot, and a *profoundly reduced* number of blood-platelets. Hemophiliacs present *normal* or *slightly* prolonged bleeding time, *enormously* prolonged clotting time, and a normal platelet count. These signs then are, as a rule, sufficiently pathognomonic of the respective form of the blood dyscrasia to be considered absolutely diagnostic.

For a more detailed discussion of this interesting subject I would refer you to the article of Dr. Reuben Ottenburg in the New York number of the Medical Clinics of North America, July, 1918, Vol. II, No. 1, p. 289, and the chapter by Dr. Henry A. Christian, in Vol. II, Pt. 2, Oxford Medicine.

CLINIC OF DR. JAMES M. BAMBER

TULANE UNIVERSITY

SARCOMA OF THE STOMACH

MISS C. B., age nineteen. First admission to Touro Infirmary, January 30, 1925.

Family History.—Has no bearing on the case.

Past History.—Prior to her present illness she had been feeling badly for about a month, especially complaining of headache, inability to breathe through the nose, and slight pain in the upper abdomen after eating. She was treated for the nose condition, and given some quinine, without improvement. It was stated that she had had measles and whooping-cough when a child. Ten or twelve years ago she was very nervous and excitable for a month or two. Otherwise past history was negative.

Present Illness.—Eighteen days ago, while preparing to go to school, the patient had a fainting attack. However, she went to school over the protests of her parents. Shortly after reaching the school building she fainted again. At this time she had a severe chill. She returned home in the school truck and was put to bed, where she has remained since. Three or four days later she began to vomit. This has persisted up to admission. The vomiting had no connection with the taking of food up to one week ago. The vomitus has been of a greenish color and of a foul, sour odor. She has had pain in the epigastrium constantly, at times rather severe with aching all over the body, together with pain in both sides of the chest. On the first day of her illness she had fever of 103° F., which was the highest point reached. Temperature ranged thereafter to 100° and 102° F., some days being normal. Seven days after the onset she had a

severe chill, which lasted from 1.30 until 5.00 A. M. For the past week she has vomited profusely many times a day, and has been unable to retain solids or liquids at all. Bowels have been stubbornly constipated and move only after drastic purgatives or enemata, given by orders of her doctor. There has been no blood in the stools or vomitus. There has been no delirium. Her last menstrual period was about December 25th. Periods had been regular since the age of fourteen, of the twenty-eight day type, with no pain.

Physical Examination.—Examination reveals a pale, well-developed, fairly well-nourished girl, with rather sunken eyes, dry mouth, moaning, restless, complaining of nausea and pain in the upper abdomen. The pupils are equal and regular, with normal reaction. The teeth are fair. Throat is negative, with no glandular enlargements. The chest is well formed. There are no definite findings in the lungs. The heart is of normal size, with no murmurs. Temperature 102.6° F., pulse 110, blood-pressure 100/85. The abdomen is not distended, and there are no real localized rigidity, palpable masses, or viscera. There is rather marked pain in the epigastrium and under the left rib margin, with slight pain on pressure in the left costovertebral angle. There is no rigidity of the neck and no Babinski.

A catheterized specimen of urine showed an occasional pus-cell. The blood-count showed: Leukocytes 15,750; neutrophils, 86; large mononuclears, 1; small mononuclears, 13.

Orders: Glucose 2.5 per cent., by hypodermoclysis. Nothing by mouth but crushed ice.

The next morning (January 31st) the bedside note read: Has some nausea. Pulse 110, slight rigidity all over the abdomen, with pain on pressure in the epigastrium.

A surgical consultant spoke against operation.

The Murphy drip was started. Glucose and sodium bicarbonate, each 5 per cent., were given continuously. By afternoon, the patient was taking fluids by mouth.

February 2d, there was less pain, pulse 90. No distention, no nausea, and no vomiting for twenty-four hours. Her general condition was improved and she felt better. Examination re-

vealed nothing, except pain on pressure under the left rib margin. She continued to improve, and by February 4th was on a soft diet.

February 18th she still continued to get along with her food, but complained of some pain on pressure over the left upper abdomen. No nausea or rigidity. Pulse rate, 80. Bowels regular.

Her temperature, which on admission (January 30th) was 102.6° F., had fallen by February 2d to 99.4° F. The pulse rate on admission was 120, and on February 2d was 80. Respiration was from 20 to 25. The temperature range was from 98° to 100° F. The pulse was from 75 to 80 up to March 2d, and was normal from that time to discharge. The respiration was 20 throughout.

Laboratory Examination.—Stool: No ova or parasites found; occult blood negative.

Stomach analysis: Free hydrochloric acid, none; total acid, 12; occult blood present.

Urine showed in twenty-eight examinations: Albumin in one; light to heavy trace of sugar in six; acetone in seven; hyaline casts in three. Pus-cells were found numerous times in voided specimens, but only a few were found in one catheterized specimen.

Blood-picture: Hemoglobin, 65 Dare; erythrocytes, 4,660,000, leukocytes, 11,750; neutrophils, 86; small mononuclears, 10; large mononuclears, 3; eosinophils, 1. No malaria plasmodia found.

Blood-count, February 1st: Leukocytes, 12,250; neutrophils, 88; small mononuclears, 9; large mononuclears, 3.

February 4th: Leukocytes, 9750; neutrophils, 81; small mononuclears, 13; large mononuclears, 4; eosinophils, 2.

February 9th: Leukocytes, 4750; neutrophils, 72; small mononuclears, 26; large mononuclears, 2.

February 15th: Leukocytes, 4500; neutrophils, 71; small mononuclears, 2; large mononuclears, 4; eosinophils, 3.

Blood chemistry, February 2d: Non-protein nitrogen, 39; urea nitrogen, 20; creatinin, 1.2; uric acid, 4.2; dextrose, 100. Blood-chemistries were repeated after this and found normal.

Widal on February 1st: Positive in dilution of 160 for typhoid bacilli.

Blood-culture on February 2d reported negative. Reported negative again on February 13th.

Widal showed slight agglutination for Bacillus typhosus in dilution of 1:40. Culture negative on February 2d.

Blood Wassermann negative.

A nose and throat consultant reported no findings of importance.

Roentgen-ray of the gastro-intestinal tract was reported suspicious of ulcer of the pylorus.

On March 4th, the patient was discharged from the hospital feeling well, with a negative physical examination, except a slight pain on pressure under both rib margins. She was advised as to diet and the use of alkalis.

Discussion.—The following diseases were considered in the differential diagnosis:

Subphrenic Abscess.—On decline of temperature, falling blood-count, improvement in patient's general condition, this diagnosis was abandoned.

Pyelitis.—This could not be sustained on the findings in the urine. There were no marked bladder symptoms.

Typhoid Fever.—The slight leukocytosis on entrance was not considered against typhoid, as we have seen such a blood-count at the beginning in this disease. The range of temperature was not that of typhoid. There were no bronchitis, no rose spots, no dicrotism of the pulse. The cultures from the blood, urine, and stool showed no typhoid bacilli. The Widal was a little disturbing, but we were sceptical of this finding, especially in these days of frequent vaccination, since we have seen people with a diagnosis of typhoid fever die with amebic ulceration of the colon, perforation, and peritonitis, with a positive Widal, comparatively slow pulse, and hemorrhage from the bowels.

Malaria.—We have seen numerous people from the same locality from which this girl comes with malaria of the estivo-autumnal type. Some have severe vomiting, and some have pain in the abdomen, with high or very little fever. However, the blood examination practically ruled this out.

Endocarditis.—The fever, the chill, and the leukocytosis

might well indicate endocarditis. The pain in the abdomen could be explained by infarcts of the spleen. She had no old, valvular disease of the heart, which is usually thought to be necessary for the diagnosis of subacute bacterial endocarditis. She had no petechiæ, no painful finger pads, and no known symptoms of any other type of endocarditis, so this condition could be reasonably excluded.

Appendicitis.—This was considered as a possible diagnosis. However, the pain was in the wrong place. There was no rigidity of the muscles in the lower abdomen, though this is not always present in cases of this disease. We did not seriously consider appendicitis as being the cause of the trouble.

Gastric Ulcer.—The Roentgen-ray report suggested this condition. One is not in the habit of seeing people enter the hospital with this picture of peptic ulcer. We suspected subphrenic abscess, with this as one of the possible sources. We did not consider this diagnosis established and she was discharged from the hospital with "No diagnosis" written on her record. We were not able to explain the sugar in the urine, unless from some pancreatic or liver disturbance, but this soon subsided and the blood-sugar was normal.

Pneumonia should always be considered when pain in the abdomen, associated with fever and an increase in the leukocytes is present. She did not speak of the pain being increased by respiration, which is usually the case in pneumonia. Of course with pleurisy, especially diaphragmatic pleurisy, there may be few, if any, signs of disease in the chest. She spoke of no pain in the shoulder and, without doubt, in eighteen days pneumonia or pleurisy would have become manifest or have subsided.

Second Admission.—April 11, 1925. After leaving the hospital she felt fairly well, but was very weak. She was in bed most of the time. Her appetite was good and she gained about 10 pounds. About a week ago she tried to walk up the steps for the first time. Since then she has been very much weaker and has been compelled to remain in bed most of the time, having some pain in the epigastric region and the upper left quadrant

of the abdomen. Her bowels have moved regularly from medication.

On physical examination nothing was found, except some pain on palpation in the epigastrium and under each rib margin. Blood-pressure was 120/90.

The Roentgen-ray of the gastro-intestinal tract was quite suspicious of a large penetrating ulcer on the greater curvature, and colitis.

Laboratory Findings.—Occult blood was found in one of four stool examinations.

The urine was negative throughout.

Wassermann was negative.

Blood chemistry negative.

Blood examination showed erythrocytes, 4,730,000; leukocytes, 7000; hemoglobin, 70 per cent.; neutrophils, 54; small mononuclears, 44; large mononuclears, 1; eosinophils, 1.

Stomach analysis: No free hydrochloric acid; total acid, 12; occult blood present.

The patient was in the hospital until May 19, 1925. Except for a few rises to 99° F., her temperature was normal. Her pulse was regular, between 80 and 100, with a respiration of 18 to 20. She complained a great deal of pain in the epigastrium, increased by the taking of food. There was no nausea or vomiting. She spoke several times of having gas in the stomach.

April 25th, she was put on the Sippy plan of treatment. Up to that time she had been getting soft food. She was also given alkalis and belladonna.

April 29th, the bedside notes said she had been having some pain in the epigastrium, and did not sleep well at night.

May 3d, she still had some pain in the left hypochondrium, and some pain on pressure in the epigastrium.

May 9th, she complained of pain in the left upper quadrant, relieved by codein. Food had no influence on the pain.

May 13th, she felt fairly well, and had had no pain in the abdomen since the 9th.

May 19th, she had had less pain in the last few days, but there was still some pain in the right hypochondrium.

Physical examination revealed nothing, except some pain on pressure in the right upper quadrant of the abdomen. She was discharged from the hospital with advice to continue the Sippy plan of diet and medication. The discharge diagnosis at the time was peptic ulcer.

Discussion.—We felt that the diagnosis of peptic ulcer was a little insecure, because of the fact that the Sippy plan of diet, with the alkalis, did not relieve the pain. Past experience has led us to feel that when one fails to get relief from this or a similar line of treatment, it is strong evidence that one is not dealing with simple peptic ulcer. While cases have been reported, in which no hydrochloric acid was found in the stomach contents, we have never seen one, though our experience in this type of disease is somewhat limited. The absence of hydrochloric acid was in favor of malignancy. The age and gain in weight since the first admission did not argue in favor of this diagnosis, however.

Syphilis of the stomach was ruled out on the family history, the past history, the difficulty of its diagnosis, and the rarity of the disease in our experience. Since the Wassermann was negative, there was no evidence of the presence of syphilis. There was no evidence of any gall-bladder disease. The stools was thoroughly studied for parasites of various kinds, and none were found. There was no evidence of tuberculosis, either of the chest or abdomen. The patient was discharged with a diagnosis of peptic ulcer, though we did not feel at all certain of this diagnosis.

Third Admission.—The patient re-entered the hospital August 25, 1925, complaining of "fever and pain in the stomach." After leaving the hospital she felt well most of the time. She has been on the diet prescribed for her, and has gained in weight and strength. Prior to this present attack, she has had two similar attacks. She does not recall the exact date of the first attack, but the second one was two weeks before this present one, described by her as abdominal pains and fever. The attack lasted two days, at which time she was nauseated, but did not vomit. Food had no relation to the onset of the attack, nor did it relieve

the pain, which occurred at various times of the day. The present attack commenced on August 24th, with pain in the stomach and both sides of the upper abdomen. The next day at noon she had a severe chill and went to bed. She began to have fever late in the afternoon and vomited blood. She was uncertain as to the quantity.

She came into the hospital at 7.55 P. M. When seen in the emergency room, she had a temperature of 105° F. The pulse was rapid. It was difficult to get definite information from her, but she complained of pain in the abdomen, more pronounced in the left hypochondrium, and extreme nervousness. Her bowels had been regular. There were no bladder symptoms or cough.

Urine: Specific gravity 1020, no albumin, no sugar, acetone ++, indican ++. Sediment showed an occasional pus-cell.

The following day the blood-picture showed: Hemoglobin, 60 per cent.; erythrocytes, 4,260,000; leukocytes, 6400; neutrophils, 83, small mononuclears, 14; large mononuclears, 3. No malaria plasmodia was found.

By the next morning her temperature had dropped to 100° F.; the pulse was 110, and the respiration 27. The bowels moved well with an enema. She felt better. She was put on liquids. The nurse stated that she slept well after one o'clock and seemed fairly comfortable. In the afternoon her temperature went to 101.8° F., with the pulse 118, and the respiration 30. She took very little food, and complained all day of some pain in the upper abdomen.

August 27th, the bedside note read: Feels better. Has some pain on pressure in the upper abdomen. Pulse, 80. No definite findings on physical examination.

August 28th, a cystoscopic examination was made. Catheterization of both ureters was negative for any genito-urinary disease.

On August 29th, the temperature ranged from 98° to 99° F. Pulse, 80. She felt fairly well except for some griping pains in the upper abdomen.

September 1st, she had a temperature of 100° F., and vomited throughout the night. After this date and up to September 4th,

the temperature ranged from 98.6° to 99° F. She complained of some pain in the abdomen, but the physical findings were still negative, except for a little pain on pressure on each side of the abdomen under the rib margin and in the epigastrium.

September 4th, her abdomen was opened. What was thought by the surgeon to be an ulcer was found in the stomach, about the middle of the lesser curvature, with some omental adhesions. The growth was removed and sent to the pathologic department for examination. Their report was round-cell sarcoma. The appendix was also removed, and was reported as showing chronic changes. After a rather stormy convalescence, the patient was sent home on a cot October 8, 1925.

Discussion.—This girl impressed us from time to time as being highly neurotic. It was difficult to get a description of the pain and its radiation, and there seemed to be a tendency toward exaggeration of symptoms. At times she became almost hysterical. We were at a loss to account for the temperature of 105° F. on admission. Malaria was quite common in the community in which she lived, but several examinations failed to reveal malaria plasmodia. After elimination of the possibility of infection in the genito-urinary tract, we advised the family very strongly to consent to an abdominal operation, as we felt confident of the existence of organic disease in the abdomen and most probably in the stomach. It is not uncommon to find fever with malignant growths, but we have never seen a temperature of 105° F. with any malignancy, and we could not account for this. After the operation the temperature was accounted for by a subcutaneous abscess in the suture line.

Fourth Admission.—On November 1, 1926, the young lady returned to the hospital, complaining of the same pain in the upper abdomen and in the right chest. About two weeks ago she began to have fever, with abdominal pains similar to those experienced previously. She now states, definitely, that the pain is made worse by food. She obtains relief by taking some small tablets, given her by a doctor.

A general physical examination was negative, except for some pain in the upper abdomen on pressure. The temperature

was 101° F. on admission, reaching normal on the fifth day. Pulse rate, 85 to 110. Respiration, 20.

Urine was negative, except for a trace of acetone.

Blood-picture showed erythrocytes, 4,925,000; leukocytes, 9250; neutrophils, 75; small mononuclears, 19; large mononuclears, 6. The Wassermann was negative. Blood chemistry was normal.

Roentgen-ray of the stomach read: There is considerable cardiospasm as the meal enters the stomach. A large mass, approximately the size of an orange, is observed to be occupying the upper portion of the stomach, involving the lesser curvature side, and obliterating the lumen of the stomach, thus dividing the stomach into two pockets. The mass cannot be palpated, due to the fact that it is very high up under the costal margin, but it is very definitely observed. The walls of the stomach are inflexible, save on the pyloric segment and greater curvature side. It can be definitely stated that a neoplasm of the stomach is existing, occupying the lesser curvature aspect of the fundus. The first and second portion of the duodenum are normal. Six hours after barium meal show the stomach to be retaining a fairly large quantity of barium.

Stomach analysis: Free hydrochloric, none; total acid, 10.

Stool negative for parasites.

The patient remained in the hospital for seven days on a liquid diet with soda and glucose drip, complaining most of the time of pain in the upper abdomen, relieved by codein, gr. $\frac{1}{2}$ subcutaneously. By this time we had centered all of our attention on the stomach. The slides were brought out again and examined by Dr. John A. Lanford, pathologist of the hospital, and again the diagnosis of round-cell sarcoma was made. The radiologist, Dr. Henderson, was sure that a new-growth was present, as described, and that the stomach was almost closed in the middle.

The patient was again sent home in the care of her local doctor.

March 31, 1927, the young lady returned for examination. She stated that she was living exclusively on milk, any kind of solid food causing immediate and severe pain, relieved only by

vomiting, the stomach remaining sore for several hours afterward. The bowels were very constipated.

Blood examination showed: Erythrocytes, 4,150,000; leukocytes, 9400; hemoglobin, 50 per cent.; differential count, normal.

Stool contained a large amount of occult blood. The urine was negative.

The following was the report of the Roentgen-ray department:

Chest negative.

Stomach.—A large lesion was occupying the lesser curvature of the stomach in the fundic portion. The lesion is so large that it almost completely occludes the lumen of the stomach. The meal passes about this with some difficulty into the median and pyloric segments. The palpable mass corresponds to this huge filling defect.

It must be concluded that the patient has a very large neoplasm in this vicinity. At six hours there is still a fairly large retention in the stomach, although, after the meal has passed beyond the obstructing lesion in the upper portion of the stomach, it seems to behave in a normal manner.

Conclusion.—A very large neoplasm in the fundus of the stomach occupying the lesser curvature.

Discussion.—Owing to the duration of the disease, we went back to the pathologist for reassurrance. He again examined his material, with the same diagnosis—sarcoma. We do not feel it would have been possible to make a diagnosis in the beginning of this case even of ulcer, much less sarcoma.

The patient is still living, but the pathologist feels that the diagnosis has been established. A recent report from her physician states that she is living on milk alone and that, though she lost ground rapidly after leaving the hospital, her condition has improved very slightly in the last few days. Those who have seen the case believe that she has only a few more weeks to live.

FOREIGN BODY WITHIN THE ABDOMEN

MRS. A., age thirty-nine, was admitted to the hospital March 8, 1926.

Complaint.—Diarrhea of three months' duration.

Family History.—Irrelevant.

Past History.—Measles and whooping-cough as a child. She has had four children, all living and well; three miscarriages. Three years before admission she had some pelvic repair work done, the left ovary and tube being removed, and an appendectomy performed. Six months before admission she was operated on for ruptured tubal pregnancy. Menses began at fourteen years of age, of the regular twenty-eight day type, and of three days duration. Five months ago radium was applied for a fibroid tumor.

Present Illness.—After her last operation, the patient suffered from constipation. She felt weak and sick, with acute abdominal pains. Enema for bowel movements gave immediate relief. About December 1st, diarrhea began, with nausea, vomiting, and sore mouth, which has lasted up to the present time. She has averaged six or seven large, watery stools a day, with three or four at night, without blood, mucus, or straining. At the beginning of the illness she weighed approximately 115 pounds; her estimated weight on entrance was 85 or 90 pounds. For the last few weeks she has had profuse night-sweats. Urinates—day, two or three times; night, none. She has no knowledge of any fever. Has had no cough or expectoration.

Physical Examination.—Fairly well-developed woman, extremely emaciated, with dry, rough skin, who appears to lie comfortably in bed. No jaundice or rash. Pupils react equally to light and accommodation. No glandular enlargements. Teeth in fair condition. There are no definite findings in the chest, except a few coarse râles scattered over the back. The heart is

negative. The lower portion of the abdomen seems distended. Liver and spleen not felt. There is a distinct resistance in the midline below the umbilicus, extending to the pubis, which is extremely sensitive to pressure. There is a scar in the midline extending from the umbilicus to the pubis. The extremities show marked emaciation. Knee-jerks are exaggerated. The mouth and tongue are red and beefy. The throat is negative.

Laboratory Findings.—Erythrocytes, 3,095,000; hemoglobin, 50 per cent.; leukocytes, 6750; small mononuclears, 47; large mononuclears, 8; neutrophils, 45; color index, .83. Polychromatophilia, stippled cells, and nucleated reds are present. Wassermann negative.

Urine negative except for indican ++++, and alkaline phosphate crystals.

Stool showed no ova or parasites.

Stomach analysis: Free hydrochloric acid, none; total acidity, 16; no Oppler-Boas bacilli present; no lactic acid.

Blood chemistry: Non-protein nitrogen, 24; urea nitrogen, 12; creatinin, 1; uric acid, 1.6; dextrose, 80.

A chart showed temperatures ranging from normal to 103.6° F. the first week, with temperature as high as 102° F. the second week, the rises occurring mostly at night.

The gynecologic report is as follows: A mass in the left iliac fossa, behind and to the left of the uterus, with other small masses scattered in the lower abdomen (probably metastases). The gynecologist recommended deep Roentgen-ray therapy, and advised against operation.

A bedside note of March 12th stated that diarrhea was still present and abdomen was a little more distended. By March 19th the patient complained of a sore mouth. The tongue looked red. There were five stools in twelve hours, and some nausea and crampy pains in the abdomen. There was nothing definite in the chest. The abdomen did not seem quite so sensitive to pressure as before. The temperature was 100° to 101° F. The patient's general condition was about the same, with persistence of sore mouth, diarrhea, nausea, and weakness.

April 4th, the bedside note read: Feels very weak and de-

pressed. Frequent stools during the night. Lungs showed coarse, moist râles all over the chest. Pulse rate, 116; blood-pressure, 104/80. The abdomen shows some distention with fluid wave. The face looks puffy; hands and feet are swollen. The tongue is sore and red, with ulcerated area near the frenum, under the surface. A proctoscopic examination showed external hemorrhoids; moderately contracted sphincter; smooth rectal mucosa, pale in color; and no ulceration.

April 13th: Patient feels better. Feet are still swollen. General examination is practically the same—diarrhea and sore mouth. Temperature ranged from normal to 103° F. The pulse grew weaker and moist râles appeared in the lungs toward the end, but there were never definite localized findings. The heart showed no signs of organic disease. Edema increased in the extremities. The blood-count was very much lowered; erythrocytes, 1,615,000; hemoglobin, 40 per cent.; leukocytes, 3000; small mononuclears, 28; large mononuclears, 0; neutrophils, 72. There were marked variations in the size and shape of the cells. The urine remained alkaline, but otherwise negative. The stools were cultured and studied, but ova or larvæ were never found.

Treatment was directed principally toward the diarrhea, for which astringents, hydrochloric acid, and diets of various kinds were given. Various washes were used in an attempt to relieve the sore mouth.

The summary of the case represents a woman, thirty-nine years of age, who entered the hospital with diarrhea of three months' duration, preceded by several weeks of constipation, sore mouth, nausea, vomiting, and emaciation. Fever and marked anemia were present throughout the illness. No hydrochloric acid was found in the stomach contents. The leukocyte count was low the last few weeks of life. Nothing in the stools pointed to parasitic infection, and there was no evidence of tuberculosis. For a few days before death, there was fluid in the abdomen, with an indefinite mass in the left lower quadrant. The patient grew weaker and weaker, and died May 17th, thirty-nine days after admission to the hospital.

Comment.—The diagnoses considered in this case were:

Pellagra.—The sore mouth, diarrhea, and emaciation were in keeping with this diagnosis. We believe that a diagnosis of pellagra should not be made except in the presence of the typical rash, and as it was not found in this case this condition was ruled out.

Sprue.—The sore mouth, the blood-picture, and other symptoms pointed toward this disease. However, the stools were not characteristically large and mushy. A search for monilia was made, but none were found, so the evidence did not seem to warrant a diagnosis of sprue.

Pernicious Anemia.—The sore mouth, gastro-intestinal symptoms, diarrhea, absence of hydrochloric acid in the stomach, and at one time the blood-picture, were strongly indicative of this disease. However, we felt the emaciation was too great to permit such a diagnosis, as, in our experience, patients dying of pernicious anemia have not shown such extreme emaciation as this.

Malignancy.—No roentgenologic study of the gastro-intestinal tract was made, on account of the patient's weakened condition. If any malignancy existed, where was it? It did not seem to be in the stomach, as no retention could be demonstrated, and there were no distinct symptoms pointing to such a condition. Malignancy of the intestines, which could have explained the pain, diarrhea, and all other symptoms, was considered. Two gynecologists who saw the case were convinced the mass in the abdomen was a fibroid, and the diagnosis of malignancy arising in the pelvis was made by another surgeon, who did not state its direct origin. However, the evidence still did not seem to be sufficient for a diagnosis of malignancy of the gastro-intestinal tract. There were only a few red blood-cells in the stools, and at no time was there any sign of obstruction or extremely marked distention, which is an important point in the diagnosis of malignancy of the intestines.

Abdominal Tuberculosis.—There were no demonstrable lesions in the lungs, and no bacilli were recovered from the

excreta. This was thought by two observers to be the most probable diagnosis.

Neither of the operations on the patient were performed at this hospital.

Postmortem.—The report of the postmortem, performed by Dr. John A. Lanford, was as follows:

The body is that of a well-developed, but extremely emaciated white female, measuring 5 feet, 4 inches, and weighing about 85 pounds. Rigor mortis is beginning. There are median incisions (scars) in the abdomen from the umbilicus to the pubis. On palpating the abdomen, there is felt in the median line about the sacrococcygeal junction a hard, oval mass, irregular in outline.

Peritoneal cavity: On opening the peritoneal cavity, we pass through a very thin wall of adipose tissue and only a thin muscular layer. The peritoneal cavity is partly obliterated by weli-organized adhesions. It is covered by the omentum, which is adherent to the underlying structures, particularly the pelvis. On removing the omentum we find that there is a small amount of fluid in the pelvis, and a lesser amount in the upper portion of the peritoneal cavity, this fluid containing flakes of fibrin. The surrounding portion of the intestines presents, in a number of places, acute congestion. There is a group of coils of the intestines which is rather firmly held together, and, on attempting to break up these coils, we find that the walls are practically ulcerated through, so that the slightest movement will cause a tear and the escape of fecal matter. This long-standing and active inflammatory reaction extends down to and involves the uterus, the posterior wall of which is the seat of a large necrotic zone, the material being structureless and greenish-black in appearance. On further examination and breaking up the coils of the intestines, we find that there is present in the pelvis at its brim, opposite the lumbosacral junction, a sponge about the size of a man's fist, to which a short string or piece of tape is attached. This sponge is completely surrounded by the intestines, particularly the ileum and the sigmoid, and by pressure the infection has caused the breaking down of the walls

of these intestines in a number of areas. It is saturated with fecal matter, being greenish-black in color. On opening up the sigmoid and rectum, they are found to be the seat of an acute inflammatory reaction, but without definite areas of necrosis other than those resulting from pressure of the sponge.

Pleural cavity: negative.

Heart: negative on external examination.

Liver: Somewhat congested and mottled, presenting a picture of fatty degeneration.

Spleen: Somewhat increased in size and the seat of an acute splenitis.

Anatomic Diagnosis.—Acute peritonitis, ulceration of intestines (ileum, sigmoid, rectum), acute enterocolitis, acute splenitis, fatty degeneration of the liver, acute and chronic metritis, and perimetritis.

Further Comment.—Here is a case of a foreign body in the abdominal cavity, causing ulceration into the intestines and producing, in some respects, the symptomatology of pellagra, sprue, pernicious anemia. The three diseases seem to be related in some of their characteristics, except that in pernicious anemia one rarely sees such marked emaciation. It is our belief that pellagra is a nutrition deficiency disease; the condition has been produced by lesions in the gastro-intestinal tract which prevented the patient from assimilating the proper amount of food. Laparotomy seemed the only procedure which could clear up the diagnosis in this case, but this was advised against by the surgeon who saw the patient on account of her unfavorable condition.

EVENTRATION OF THE DIAPHRAGM

MRS. G. M. C., age forty-five years, housewife, came in for examination October 28, 1926.

Past History.—She was operated on in 1910 for some kind of tumor in the abdomen and curuncle. She has no children and has had no miscarriages.

Family History.—Husband died nine months ago from tabes.

Present Complaint.—Four years ago, after lifting a heavy can, patient states she had severe pains in the lower chest. She vomited for three months afterward, especially after eating. She was in bed most of the time. Since the onset of the trouble, she has complained of shortness of breath on exertion, with some pain in the left lower chest and upper left abdomen. The pain is not constant, but comes and goes. She has some pain in the left shoulder and a great deal of gas in the stomach and abdomen. As a rule, food does not cause any distress. The bowels are constipated. She has had very little cough and no expectoration. Menses are regular. No genito-urinary symptoms, loss of weight, fever, or edema have been noticed.

Physical Examination.—This reveals a well-developed, well-nourished woman, without cyanosis, respiratory distress, edema, jaundice, or discoloration of the skin. The throat, vessels, glands, and reflexes are negative. All of the upper teeth have been removed; the lower ones are in fair condition. Chest: Breath sounds harsh over the right lung, with normal resonance front and back. In front dull tympany is noticed in the left lung; fremitus is absent below the third rib; breath-sounds are diminished to the third rib, and absent below it. There are posteriorly diminished breath-sounds to the fifth vertebral spine, sounds being absent below. There is slightly impaired resonance on percussion, with a tympanitic quality and a few bubbling noises in the lower half. The heart was apparently displaced slightly to the right. There were no murmurs and the heart-sounds were

good. Blood-pressure was 140/90. The abdomen showed no palpable masses or viscera. The lower extremities were negative.

Another examination, some time later, showed practically the same signs, except for a few sticky râles over the upper left half in front. The breath-sounds were faintly heard over the lower half of the lung, and the heart did not seem to be displaced as much as in the former examination. The coin sound was not positive, but was suggestive of air in the pleural cavity.

Laboratory Findings.—Urine negative, stools negative, except for the presence of occult blood (the patient was on a full diet). The blood-picture showed nothing of note.

Discussion.—A middle-aged woman, well developed and well nourished, not in any particular distress, presented herself for examination, complaining of shortness of breath on exertion, and gas in the stomach. The condition had lasted for four years, but had not been constant.

Cardiac failure should be thought of in the presence of shortness of breath on exertion, but this is not, by any means, the sole cause of this symptom. The case presented no cardiac enlargement, apparently the heart being slightly displaced at one examination, and that to the right. There were no murmurs; the rhythm was regular and the sounds good. A diagnosis of hypertension could not be made. There were no signs of passive congestion in the extremities, the liver, or the lungs. Therefore heart disease was ruled out.

The physical findings in the lungs pointed toward air in the left pleural cavity. This might explain all of the symptoms and physical findings. The coin test was not typical and the symptoms had been present, on and off, for four years. It did not seem possible that pneumothorax could last this long and give this type of history. The patient was well nourished, had no fever, and gave no evidence of the disease most commonly the cause of pneumothorax—tuberculosis.

Gastric flatulency was considered. During the menopause, women of this age often complain of shortness of breath, fulness in the upper abdomen, and precordial pain, but the tympanitic

note and the absence of breath-sounds reached too high and were too marked for a simple distended stomach.

The diagnosis was not made until after the Roentgen-ray examination, but probably should have been from the long history and the gurgling sounds so plainly heard in the chest, posteriorly. The radiologist reported eventration of the diaphragm, on the left side. Her symptoms were somewhat relieved by carminatives, laxatives, etc.

The most important part of the differential diagnosis would seem to be the possibility of mistaking the condition for pneumothorax. Diaphragmatic hernia was also considered, but was eliminated after studying the Roentgen-ray findings.

CLINIC OF DR. F. M. JOHNS

TULANE UNIVERSITY

INTERESTING CLINICAL LABORATORY FINDINGS IN CHRONIC PULMONARY ACTINOMYCOSIS AND THE AMERICAN VARIETY OF CUTANEOUS LEISHMANIASIS

Case I.—A very purulent sputum from Mr. A., mechanic, thirty-nine years old, was referred by Dr. G. P. Garland of

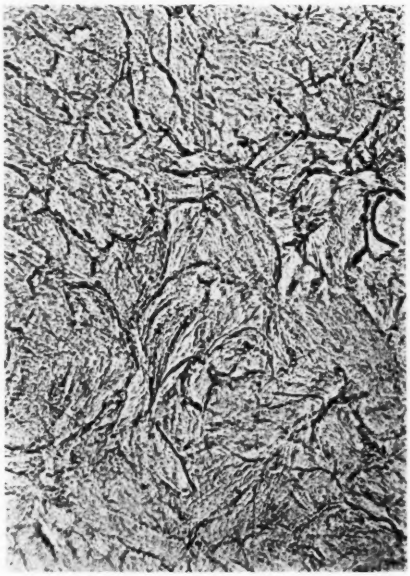

Fig. 101.—Actinomycotic granules from sputum under high dry magnification.

Eunice, La., for examination. Each of several specimens examined showed a thick, creamy purulent sputum containing

numerous white cheesy granules varying in size from 0.1 mm. to 3 mm. in diameter. These granules, when pressed out under a cover-glass and examined under the low and high dry magnification of the microscope, presented all of the characteristics of actinomycotic granules (Fig. 101). The individual organisms were slightly larger and longer than tubercle bacilli, and were acid-fast. Figure 102 shows a portion of a granule stained with the acid-fast stain—the masses of organisms present photographing a dense black, while toward the thinner portion of the smear the individual rods may be seen. A very few branching

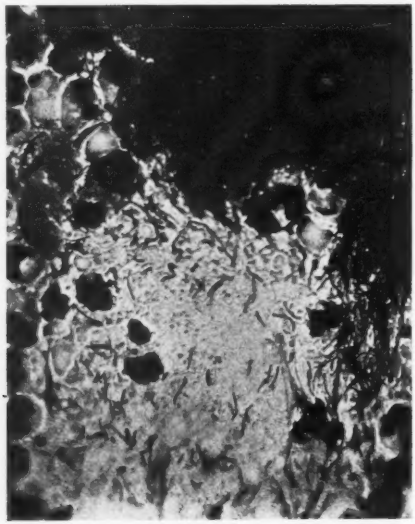

Fig. 102.—Portion of granule stained with acid-fast stain. The black portion consists of dense masses of acid-fast rods which photograph black.

forms were found. The organisms grew into long filamentous forms on glucose agar, and retained the fuchsin, after acid decolorization, in transverse bands alternating with non-acid-fast segments. It was not pathogenic for guinea-pigs either direct from the sputum inoculation or from the cultures.

It was very interesting to learn that this patient had been

diagnosed as tuberculous for some twelve years, during which time numerous *x*-ray and sputum examinations had been made, all of which re-affirmed the original diagnosis. The patient had been only partially disabled with occasional transient periods of fever. Expectoration had always been profuse, and the presence of numerous large granules in the expectoration had been noted by the patient, who, being a mechanic, had noted that the larger ones even measured up to $\frac{3}{16}$ inch!

A very favorable reduction in the quantity of sputum has resulted during the past month, following rather large doses of iodids.

Case II.—Major B., forty-five years old, an explorer engaged in investigating the Maya ruins of British Honduras, was stung in the middle of the forehead by a large fly of the Tabanid family.

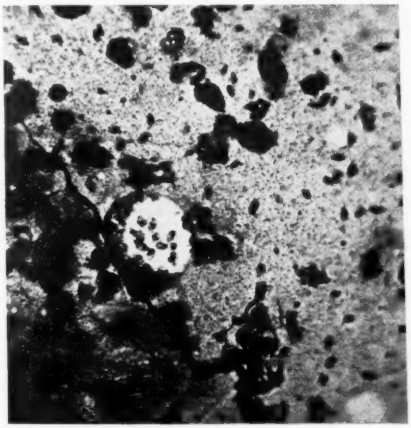

Fig. 103.—Leishman-Donovan bodies in mononuclear cell stained with Wright's stain from base 2.

At the site of the bite, a small papule developed about a week later. This gradually enlarged during the following four months, and presented a raised nodule, the size of a cherry, and of a reddish-purple color. There was no ulceration or evidence of

local inflammation. The nodule was incised, and the contents were found to be of a granulation-tissue consistency. Smears made and stained for a half-hour with Wright's stain revealed numerous Leishman-Donovan bodies, both free in the smear and growing in the proliferated endothelial cells (Fig. 103).

As the lesions of the Central American variety of Leishmaniasis are apparently limited to the skin, the lesion was destroyed with the actual cautery.

CLINIC OF DR. R. W. MENDELSON

UNITED STATES MARINE HOSPITAL, NEW ORLEANS

PLAGUE

IN presenting these cases I wish to express my appreciation to both Surgeon W. C. Rucker, United States Public Health Service, in charge of the United States Marine Hospital at New Orleans, and also to Surgeon T. B. H. Anderson, United States Public Health Service, the Executive Officer, for valuable assistance in collecting the various data.

Bubonic plague is sufficiently rare in the United States to warrant not only the study of the clinical side of these cases, but also to consider in some detail their epidemiology.

Epidemiology.—The two patients, both male Japanese, were admitted to the Marine Hospital on October 25, 1926, at 5 P. M., having been taken off of the Japanese S. S. Manila Maru. This vessel belongs to the Osaka Shosen Kaisha Steamship Line, and is engaged in passenger and cargo service around the world. The history of this vessel as submitted by Surgeon D. C. Turnspeed, United States Public Health Service, in charge of the New Orleans Quarantine Station, is as follows:

The S. S. Manila Maru left Yokohama on July 14, 1926. The last case of human plague on the bill of health was July 12, 1926, at which time there were 5 cases of human plague with three deaths in the city of Yokohama. The vessel was at dock one day. She next called at Kobe on July 17, 1926, and was at dock for some twenty-five hours. The bill of health for this port on that date is clean. She next called at Nagasaki on July 19, 1926, being anchored $\frac{1}{4}$ mile in the stream, and was sixteen hours in port. The bill of health for this port is clean. Pro-

ceeding to Hongkong, she arrived there July 24, 1926. She was two days in this port, anchoring $\frac{1}{4}$ mile in stream, and the bill of health was clean for plague. From Hongkong she proceeded to Saigon, and arrived there on July 28, 1926. The bill of health shows one case of human plague and one death, the last case of human plague being on July 24, 1926. From Saigon she proceeded to Singapore, where she arrived on July 31st, being at dock for some thirty-six hours. The bill of health for this port shows one case of human plague, and one death on July 17, 1926. From Singapore she proceeded to Colombo, and was anchored $\frac{1}{2}$ mile in the stream. She was twenty hours in port on August 17, 1926. The last case of human plague was on December 19, 1925, and the last case of rodent plague was on December 5, 1925. From Colombo she next proceeded to Durban, and was at dock for thirty-six hours on August 21, 1926. The bill of health for this port is clean for plague. We find her next arriving at Cape Town on August 27, 1926, where she was at dock for two and a half days, with a clean bill of health for that port. From Cape Town she sailed for Buenos Aires, and arrived there on September 25, 1926, being at dock for eleven days. The last case of human plague reported from this port was on June 30, 1926. From Buenos Aires she proceeded to Santos where she arrived October 6, 1926, and remained at the dock for eight days. The bill of health for this port is clean for plague. At Rio de Janeiro she arrived on October 7, 1926, and was at dock for thirty hours. No plague is reported on the bill of health. The vessel arrived at quarantine, New Orleans, Louisiana, on October 25, 1926, at 5 P. M. with a crew of 118, and 71 passengers. This crew originally signed on in Kobe, Japan, there being no changes during the voyage. All the passengers on the ship were from South America, 68 being in transit to Japan. There was free communication with shore at all ports of call. The passenger list shows that there were 500 steerage passengers en route from Japan to Buenos Aires, all being well. There were 2 cases of bronchitis, one injury, and no deaths during the voyage from Yokohama to Buenos Aires. At this port the vessel was empty of all cargo, no dead rats being observed. The first dead rat

was found on October 21, 1926. From October 21st to October 24th, the date of the arrival at the port of New Orleans, twelve dead rats were found.

The first case of human plague (a fireman) occurred on October 22, 1926. He had an enlarged femoral gland, clinically typical of plague. The diagnosis was confirmed, bacteriologically, at the United States Marine Hospital in New Orleans.

The second case (a boatswain) occurred on October 23, 1926. He also had an enlarged left femoral gland, and the case was clinically and bacteriologically positive for plague.

Preventive Measures Taken.—Upon arrival of the vessel at quarantine, the temperatures of all personnel were taken, and a glandular examination was also made. No further cases were discovered. Sixty-four steerage passengers and sixty-two of the crew were detained at quarantine, and the vessel was ordered to proceed to New Orleans where it was anchored in the stream. The two plague cases were removed to the Marine Hospital for isolation and treatment.

The remainder of the crew and all personnel were kept under observation for seven days. No further case of human plague developed.

Treatment of the Vessel.—The vessel was fumigated throughout, while loaded, on October 25, 1926, with 10 ounces of cyanid to each 1000 cubic feet, with a twelve-hour exposure. This was repeated on October 27th and 30th, on account of finding live rats on board while cargo was being discharged. After the discharge of the cargo and after all dead space throughout the vessel had been opened up, it was refumigated empty on November 11th and 12th, with a double dose of cyanid and a twelve-hour exposure. After this, a complete search of the vessel revealed only five rats in hold No. 5. After the vessel had been thus fumigated, and all rats exterminated, it was allowed to go alongside of the rat-proof dock in order to load cargo. The vessel was trapped each day from October 26th, and, as a result, only one rat was secured. Three other rats were killed during the time intervening previous fumigations. The vessel was under guard at all times.

Treatment of the Cargo.—All cargo for New Orleans and Galveston was discharged into barges. This cargo consisted of coffee, and each sack was carefully inspected. If any sack had a hole large enough to permit entrance of a rat, it was dumped on canvas, and resacked before discharge. This cargo was again fumigated, while in barges, with a double dose of HCN before it was discharged on a rat-proof dock in the Industrial Canal. All other transit cargo was discharged refumigated, and reloaded after the vessel had been fumigated while empty. Numerous dead rats were found in the cargo as it was being discharged as a result of the three previous fumigations.

Rodent Report.—Four hundred and thirty-one rats were recovered during the treatment of this vessel, classified as follows:

Mus alexandrinus	173
Mus rattus	136
Mus musculus	122

The City Board of Health Laboratory reports that eighteen single inoculations and four combined inoculations into guinea-pigs were positive for rodent plague. Twenty of the infected rodents were Mus alexandrinus, two were Mus rattus.

Observations and Conclusions.—It is noted that more than one-third of the rats aboard this vessel were Mus alexandrinus. In this connection it may be stated that as a result of two fumigations of the Brazilian S. S. Aracaju on June 12th and November 4, 1926, at New Orleans, seventy-four rats were recovered, and these were all Mus rattus. This vessel was from only the Brazilian ports of Santos, Rio de Janeiro, and Victoria.

On account of

1. The class of rats (Mus rattus) at Brazilian ports.
2. Presence of human plague in Buenos Aires in June, 1926.
3. No plague reported from Brazilian ports.
4. As previously stated, no dead rats having been observed while the vessel was emptied at Buenos Aires.
5. The majority of rats aboard being Mus alexandrinus.
6. On account of the time elapsing between the time the vessel was emptied at Buenos Aires (approximately thirty days)

until the first dead rat on the vessel was discovered (October 21, 1926), it is deduced that this vessel was probably infected with plague at Buenos Aires, Argentine.

The recommendations to the Master and Agents of this vessel were as follows:

They were furnished with copies of recommendations as compiled by a rat-proofing expert of the United States Public Health Service, who pointed out the various defects of the vessel, and the repairs necessary to make it rat-proof; also the materials necessary for stopping up existing rat-runs as a temporary measure were specified. It was also specified as an additional temporary precaution, the vessel be trapped at all ports of call to keep down the rat population. This vessel left New Orleans on November 17, 1926, bound for Christobol, Canal Zone; San Pedro, California; Honolulu, Hawaiian Islands, and Japan.

CLINICAL HISTORIES

Case I.—This patient, a male Japanese, Arashima Chomatsu, was admitted to the Marine Hospital, New Orleans, on October 25, 1926, at 5 P. M. The physical examination on admittance was as follows:

The patient is in a stuporous condition, muttering a few words now and then, and found in dorsal decubitus.

Head and Neck.—Negative.

Heart.—Is rapid, sounds are soft, rhythmical. There are no murmurs.

Blood-pressure.—Not taken.

Lungs.—No impairment on percussion noted at the time. Auscultation reveals a moderate number of dry râles over the anterior part of the left lung, but no moist râles.

Abdomen.—Somewhat distended.

Reflexes.—Somewhat sluggish, but all intact.

Glands.—The cervicals are palpable. There are no epitrochlears. In the right femoral triangle is a reddened area, dull in color, brawny to touch, in the center of which is a mass of glands that are tender.

Extremities.—Negative.

Genito-urinary System.—Negative.

Previous Personal History.—Could not be obtained.

The clinical record of this case is summarized day by day as follows:

The temperature on admission was 102° F. at 5 P. M., with a pulse rate between 110 and 120. It will be noted from the temperature and pulse chart that this case ran a typical clinical course of what is known as septicemic plague. The first day in hospital was fairly good, but on the 26th the patient was nauseated, sleeping at intervals, with periods of restlessness when

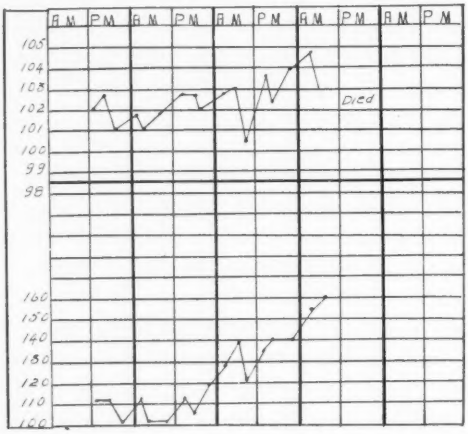

Fig. 104.—Case I. Temperature and pulse chart.

awake. At times he endeavored to get out of bed. On the 27th he began coughing with some expectoration. He voided frequently in small amounts. The abdomen was considerably distended, and the patient was evidently very uncomfortable, as indicated by his increasing restlessness. He refused nourishment, tried to get out of bed, and his restlessness continued during the night. On the morning of the 28th he had two involuntary bowel movements, and did manage to get out of bed. He died at 5.15 A. M.

Laboratory Report as follows:

The blood-culture was positive for Bacillus pestis. Fluid from inguinal bubo, smear, culture, and guinea-pig inoculations were all positive for Bacillus pestis.

Treatment.—Besides the indicated symptomatic treatment, this patient was given 160 c.c. of plague serum (Parke-Davis). The patient died at 5 A. M. October 28th, and his temperature at the time of death was 103° F., with the pulse-rate above 160.

Postmortem Examination (as conducted by Surgeon Rucker): —The body is that of a well-developed Japanese, male, about thirty-five years of age. Postmortem rigidity and lividity are well marked. Hemorrhagic areas about neck, upper chest, shoulders, lower chest, thighs, and on legs. The darkest area is about 8 inches in diameter, and has its center on the femoral glands. Blood escapes when incision is made from symphysis mentis to symphysis pubis. Subcutaneous fat fairly well marked. A serous exudate escapes from the abdominal incision. A yellowish fluid escapes from the peritoneal cavity when this is opened. There are adhesions between the base of the right lung and plastron opposite fifth and sixth ribs. There are enlarged glands at the roots of the lungs. There are firm adhesions between the entire left lung and its opposing costal surface.

Tongue and soft palate negative.

Lungs are dark and mottled. Some purplish areas present. Old adhesions over upper lobes of both lungs. Glands at roots are enlarged.

There is considerable fluid in the pericardium. The heart is apparently normal. Chicken-fat clot in its cavities.

Liver varies in color from a grayish slate to purplish. Small hemorrhages beneath the capsule. Cut surface shows small hemorrhages, tissue quite fragile. Gall-bladder negative.

Retroperitoneal glands are enlarged, and hard like shot.

Spleen enlarged and shows subcapsular hemorrhages. Tissue quite firm. There is a small supernumerary splenic body present.

Suprarenals normal in size and consistence.

Right kidney enlarged. Capsule strips easily. Bleeds on cut section. Many small hemorrhagic areas.

Left kidney, same changes as in right.

Pancreas, smaller in size than normal.

Urinary bladder, markedly distended, not opened.

Appendix, normal.

Femoral buboes, hemorrhagic, little serum exudes from them. All glands below Poupart's ligaments are involved.

Anatomic Diagnosis.—A. Primary fatal lesions.

1. Acute bubonic plague.

B. Secondary, terminal lesions.

1. Acute toxic nephritis.
2. Acute toxic hepatitis.
3. Acute toxic splenitis.
4. Chronic passive congestion of all viscera.

Microscopic Examination.—All sections show characteristic changes, to be found in a case of bubonic plague. The microscopic pathology as reported by Pathologist Bergeron is as follows:

1. Pancreas: Acute passive congestion. Parenchymatous degeneration. Architecture is normal. Vessels are engorged and the parenchymatous cells are swollen. There are many bipolar bacilli, morphologically Bacillus pestis observed in many fields.

2. Spleen: Acute splenitis. Early focal necrosis. Normal architecture is disturbed, the trabecular markings are indistinct, and the malpighian follicles are not distinct. The pulp-cells are swollen. There are, throughout the section, many collections of cells that look like leukocytes, suggestive of beginning focal necrosis. The cavernous veins are dilated and congested. There are, in many of the fields, collections of bipolar bacilli, suggestive of Bacillus pestis. Smears from the spleen show bipolar bacilli and coccoid forms, morphologically B. pestis.

3. Kidney: Parenchymatous degeneration. Acute tubular nephritis. The normal markings are not disturbed. The glomeruli show no apparent change, except for slight hemorrhage into the glomerular space in some few areas. The tubular epithelium is markedly swollen and degenerating in some areas, some of the

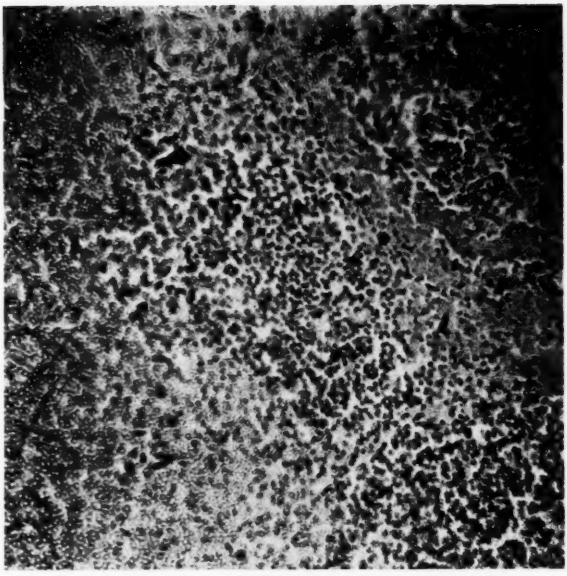

Fig. 105.

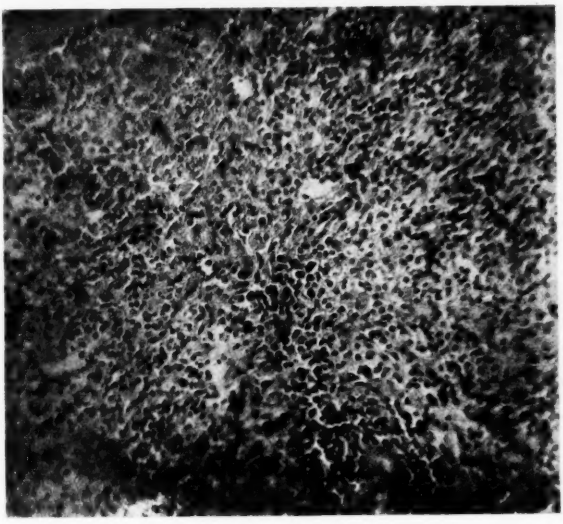

Fig. 106.

tubules containing serum and casts. Smears from the kidney show many bipolar bacilli, morphologically Bacillus pestis.

4. Lung: Acute passive congestion. Beginning necrosis in some areas. The tissues everywhere are engorged with red blood-corpuscles, polymorphonuclears, lymphocytes, and some plasma-cells. Many mitral cells (pigmented mononuclears) are observed throughout the section. The alveolar walls are thickened and engorged with red blood-corpuscles. The alveolar spaces are obliterated in many areas, and there are some emphysem-

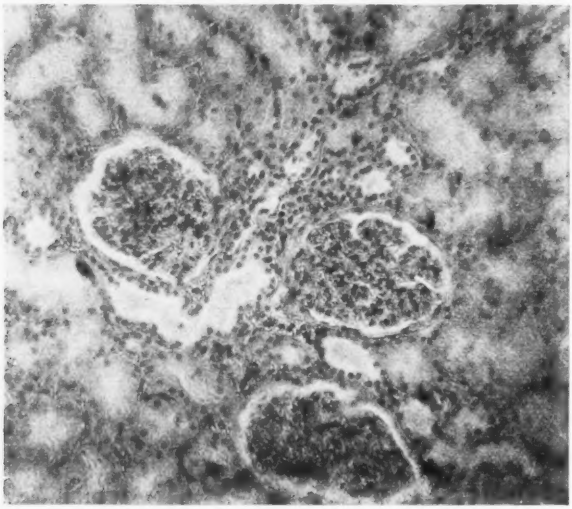

Fig. 107.

atous areas. The blood-vessels and lymph-channels are engorged. There is an infiltration of mitral cells and lymphocytes in the peribronchial tissues. The bronchial epithelium is swollen and congested. No bacilli are observed in the tissues. Smears made from the lung tissues show a few bipolar bacilli, morphologically Bacillus pestis. Cultures from the lung show a mixed infection with many Gram-negative, bipolar bacilli.

5. Liver: Acute passive congestion. Early central necrosis. Parenchymatous degeneration. The section shows marked

congestion of the tissues throughout. The central veins are dilated, and congested with red blood-corpuscles. There is a beginning central necrosis observed in many areas. The liver-cells are swollen. The sinusoidal and perilobular tissues show infiltration with leukocytes. In some areas a few bipolar bacilli, morphologically Bacillus pestis, are observed. Smears from the liver show bipolar bacilli, morphologically B. pestis.

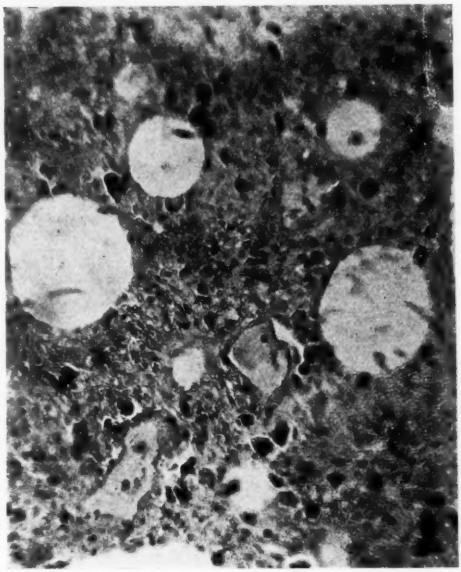

Fig. 108.

6. Lymph-nodes: Acute lymphadenitis showing hemorrhagic and necrotic areas. The lymphoid tissues of the cervical, submaxillary, inguinal, femoral, mesenteric, and axillary nodes show a varying amount of inflammatory change. The normal markings are not distinct in many sections. The germinal areas or nodules are not prominent, and the perifollicular lymph-sinuses are engorged with red blood-cells and large endothelial cells. The reticulo-endothelial cells throughout show hyperplasia. In many

areas, especially about the germinal centers, there is much hemorrhagic change and a varying amount of focal necrosis, in some instances the necrosis being so extensive as to destroy the normal architecture of the tissues. Scattered diffusely throughout the tissue in many sections are numerous bipolar bacilli and coccoid forms. In other areas are found large clumps

Fig. 109.

of bipolar bacilli and coccoid forms, morphologically Bacillus pestis.

Bacteriologic Findings.—Blood-culture positive, confirmed by guinea-pig inoculation.

Fluid from inguinal bubo, smear and culture positive, confirmed by guinea-pig inoculation.

Cultures from all organs at autopsy showed mixed infection and numerous Gram-negative, bipolar bacilli, morphologically Bacillus pestis.

Case II.—Patient, a male Japanese, Matsumoto Asamatsu, was received in the hospital on October 25, 1926, at 5 P. M., with a diagnosis of bubonic plague.

Physical Examination.—The patient, in bed in dorsal decubitus, presents a marked flush on cheeks and body. He is quite rational, and seems interested in his condition.

Head and Neck.—Negative, except for the flushed condition of his cheeks.

Heart.—Sounds are of fair quality, but the beat is rapid. Blood-pressure not taken.

Lungs.—No impairment of percussion note. Breathing is somewhat resonant, and in the left base, anteriorly, there is a patch of moist, crepitant râles.

Abdomen.—No tenderness ascertained, but abdomen is quite tympanitic and distended.

Reflexes.—Are present and active. The pupils react a little slowly. All other reflexes intact.

Skin.—Negative.

Extremities.—Negative.

Glands.—In the left femoral region is an intensely reddened area, not particularly painful, which has a brawny feel. In the center of this is a mass of swollen glands.

Clinical Record.—The clinical record is that of a typical case of severe bubonic plague, complicated by a septicemia and a pneumothorax. This patient has been ill up to date, some four months. Only during the last week has his temperature declined to normal without showing any septic tendencies.

The clinical record of the case from day to day, that is, from the date of admission up to January 18th, is as follows:

As stated before, when the patient was admitted to isolation he was complaining of pain in the left femoral region. On the 26th 160 c.c. of plague serum were given, and the patient got a severe reaction with chills and urticaria. His condition was toxic. On the 28th he was not improving, and complained of extreme pain in the left groin. He seemed quite contented and, although appearing toxic, he spoke and looked well. The abdomen was distended with gas. His distention on the 29th was ex-

treme, and enemata gave only fair results. The temperature on this day dropped suddenly in the evening. The following day he appeared much better. There was a slight conjunctivitis in the left eye.

On the 31st the patient's improvement continued. The temperature remained normal, the pulse going down. Smears from the infected eye showed a mixed streptococcus and staphylococcus infection. Ten per cent. argyrol was ordered.

November 2d. Conjunctivitis continued. Ten per cent. argyrol every four hours. Temperature 98.6° F. On November 4th, he showed some swelling of the left foot. The left inguinal bubo showed apparent fluctuation, and was incised. There was no pus. Temperature was septic. On November 6th, the bilateral, anterior cervical glands were swelling, and the patient complained of pain. The temperature range was from 98.6° to 102° F.

November 8th, the condition remained unchanged. The patient was sleeping much of the time, and complained of considerable pain in the involved areas. On the 10th, the general maximum of temperature was 100.5° F. The pulse was maintained at a low level. The appetite was only fair. There appeared on November 13th a swelling at the left elbow, without redness or marked pain, apparently a hematoma at the site of saline infusion.

On November 16th, swelling at the left elbow increased, and there was evident fluctuation. It was incised, and drained pus freely. A specimen was sent to the laboratory for examination. It was cultured, and the report on November 18th showed a streptococcus infection. Two abscesses in the calves were incised. On the 18th, $1\frac{1}{2}$ c.c. of manganese butyrate were given. Also 20 c.c. of mercurochrome intravenously. The temperature continued a septic course, but the general condition seemed quite good, considering the length of the illness. The appetite was fair.

On November 19th the glands in the neck were incised, and thick pus was found, and there was now a free discharge from all incisions, necessitating daily dressings. The condition remained

unchanged, the temperature running a septic course, and, on December 4th, *x*-ray findings by Dr. Anderson confirmed the diagnosis of a pneumothorax. The temperature range was slightly lower, the condition of the patient was not good.

The patient was becoming very anemic, and on December 12th he was transfused. The good effects of this transfusion were apparent the following week, but the specific condition continued.

On the 20th of December the temperature was approaching a normal range. In order to hasten resolution and healing, ultra-

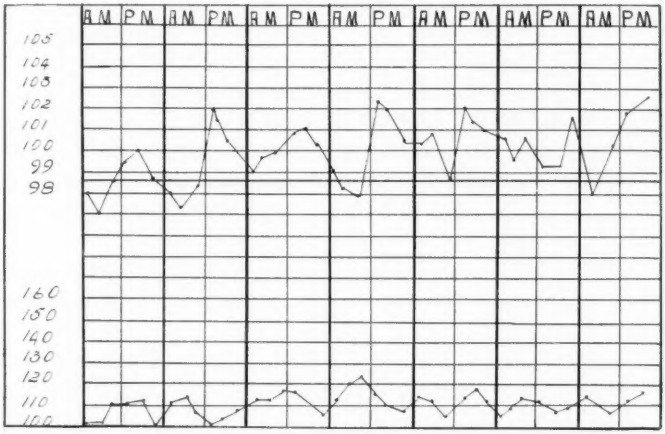

Fig. 110.—Case II. Characteristic temperature and pulse chart during height of disease.

violet ray treatment was instituted at the site of the abscesses. The patient's condition was now very much improved. On January 6th, the temperature was normal, and, on the 10th, the effects of the ultra-violet ray were apparent and the abscesses were healing.

January 14th, an *x*-ray showed a return of the deflated right lung, and, on January 18th, the patient was in a rolling chair, and should have an uninterrupted recovery.

Laboratory Reports.—10/27/26—Urine: Reaction, acid; albumin, trace; sugar, 1.53 per cent.; casts, few granular; specific gravity, 1023.

10/28/26—Urine: Reaction, acid; albumin, trace; bile, negative; sugar, negative; casts, negative; specific gravity, 1023.

11/1/26—Blood-culture positive for Bacillus pestis. Fluid from inguinal bubo, smears, cultures, and guinea-pig inoculation positive for B. pestis.

11/12/26—Blood: Reds, 3,470,000; whites, 11,200; hemoglobin, 60 per cent. Differential: Neutrophils, 69; Small Mononuclears 28; transitionals, 2; eosinophils, 1; parasites, negative.

11/15/26—Blood-culture negative.

11/18/26—Pus from arm, culture shows streptococcus.

11/26/26—Blood-culture negative.

11/29/26—Blood Examination: Reds, 3,400,000; hemoglobin, 55 per cent.; whites, 16,400. Differential: Neutrophils, 83; Small mononuclears, 14; Large mononuclears, 2; eosinophils, 1.

11/29/26—Urine: Reaction, acid; bile, negative; albumin, trace; sugar, negative; specific gravity, 1020; casts, large granular.

12/10/26—Blood: Reds, 2,170,000; whites, 10,800; hemoglobin, 55 per cent.; Differential: Neutrophils, 87; small mononuclears, 10; transitionals, 2; eosinophils, 1.

12/17/26—Urine: Reaction, acid; bile, negative; albumin, negative; sugar, negative; specific gravity, 1010; casts, negative.

12/19/26—Culture: From neck, streptococcus; from bubo, streptococcus; left leg, staphylococcus contamination; right leg, negative.

1/5/27—Blood: Reds, 4,850,000; whites, 12,000; hemoglobin, 80 per cent.; parasites, negative. Differential: Neutrophils, 69 small mononuclears, 28; large mononuclears, 3.

DISCUSSION

Epidemiology.—It is hardly necessary to remark on the importance of determining the origin of a case of plague, but it is not always an easy matter to arrive at such a determination. The detailed epidemiologic history of the 2 cases here presented

as worked out by Surgeon Turnspeed, amply justify his logic conclusion that the origin of the infection was in Buenos Aires, Argentine.

Plague is no respector of occupation, age, or sex, but atmospheric temperature and humidity have a determining effect. In Siam, *e. g.*, plague usually comes with the advent of the cool season, that is, along in the latter part of November and the beginning of December. It begins to subside as the hot season arrives, and eventually disappears after the heat has become well established.

There are several reasons for this. High temperature combined with a high humidity inhibit the development of both fleas and the plague bacilli within the flea's stomach; also human contact is less pronounced during the hot season.

In the Far East, where plague is a common disease, a certain periodicity has been noted with regard to its disappearance in epidemic form. In Siam it usually ran a cycle of from four to five years. This may possibly be explained by the immunity developed during an epidemic, thus protecting the people about that length of time. Eventually, of course, the epidemiology of plague is based upon the life history of the rat, its migrations, and its parasite, the flea, with special reference to the life cycle of the latter.

Clinical.—Plague is usually classified as bubonic, septicemic, and pneumonic. An ambulatory type is recognized by some authors. It is in fact, according to my experience, a mild bubonic type.

In considering the 2 cases here reported, we may classify them clinically as septicemic and bubonic. *Case I* is typically septicemic in its clinical manifestations. We have a very sudden onset, a most severe toxemia from the beginning, a moderately high temperature and a short fatal termination. This type of plague depends entirely upon the entry of large numbers of bacilli into the blood-stream. It is to be noted that plague bacilli may be recovered from the circulation in about 30 per cent. of all types, but the clinical septicemic type of plague necessitates

introduction and development of very large numbers of the inciting organism.

Permit me to repeat that, from the very onset, this patient suffered from a severe toxemia as noted in the clinical record. The temperature is characteristic—immediately before death it was 103° F., and a few hours before death it was 105° F., with a pulse rate of 150. The blood-culture was positive at all times, the duration characteristically short, and the termination fatal.

As a rule, there is no particular set of enlarged lymphatic glands antemortem in this type of plague, although, postmortem, the entire glandular system shows congestion. In this particular case, we do have the primary bubo, but from the clinical picture it is evident that the blood-stream was heavily infected, and the course typically septicemic.

Case II may be classified, clinically, as bubonic. Although the blood-culture was positive, it will be seen from the laboratory reports that but one positive culture was obtained. This would indicate that sufficient numbers of plague bacilli did not enter the blood-stream to produce a septicemic clinical picture.

The complications in this case of plague are interesting and more or less typical of the severe bubonic type. The pyemic condition is not so uncommon, and this particular case well illustrates the seriousness of such a complication. I have seen it often in the Orient, and, naturally, it affects the prognosis materially. The severe anemia noted in this case we often find in acute infections. It is interesting to observe the more or less immediate results obtained following a transfusion. The red count responded shortly and the patient's condition in general improved. The pneumothorax was certainly an unexpected complication. This patient did not suffer a pneumonic plague and we may account for it as a complication of a hypostatic pneumonia.

Prognosis.—The prognosis in general is as follows:

For pneumonic plague, practically 100 per cent. fatal; for

septicemic plague, between 70 and 80 per cent., as noted in Siam at least; and for bubonic plague, about 40 per cent. terminate fatally. Permit me to emphasize the importance of a guarded prognosis in a case of ordinary bubonic plague. Cases that clinically seem hopeless often recover, while some patients who seemingly are taking care of their infection suddenly die. Of course, in pneumonic plague one is justified in prognosticating a fatal termination.

Treatment.—No specific treatment has yet been discovered for plague. In Siam, where I have had the opportunity of treating hundreds of cases, I must confess that the termination of an infection would seem to be a personal equation. I have used different serums, but have not been able to convince myself that in any particular case the end-result was at all affected by such medication. One may be mislead as to the value of a particular line of treatment during an epidemic in view of the fact that different epidemics do not run the same virulent course, therefore, if one limited the treatment of plague during a particular outbreak to only one line of treatment, and that particular epidemic was of a less virulent type than others, the conclusions arrived at with regard to the treatment would be entirely misleading. Do not misconstrue the meaning of my words. I should advise the employment of antiplague serum in all cases. In order to be of benefit it must be given very early. This is not always possible during epidemics, and especially is this the case in the Orient. My therapeutic pessimism may, therefore, be criticized as being based upon a wrong technic. It might be stated that, had I employed serum treatment in the early stages, my results might have been more impressive. On the other hand, I have had the opportunity of using serum in early cases, and it has not influenced my opinion to any marked degree. I would sum up the treatment of plague, that is, ordinary bubonic plague, by stating that the patient should be given all possible advantage of serum treatment, and he should have the best nursing obtainable, while the physician should carefully keep an eye on the development of complications. Symptomatic treatment combined with stimulating food and proper nursing in

order to maintain the patient's resistance, is, I believe, the best we can do at present.

Prophylaxis.—In considering the question of prophylaxis, we may briefly sum it up under the headings of personal and public prevention. In the Far East the prevention of plague is today almost a hopeless proposition. With regard to personal prophylaxis, the upper classes and the Europeans usually escape. This is, of course, due to the fact that personal hygiene is more closely observed. The sanitary environment of a European's house or that of a very high class native is infinitely better than that of the lower classes. Also, during epidemics the European and the more highly educated native will take advantage of the protection afforded by the use of plague vaccine. With regard to the public at large, it is an entirely different proposition. Conditions in the Orient could not be better from a sanitary point of view for the propagation of plague.

Let us consider for a moment the city of New Orleans. The prevention of plague in this city would not at the present time be such an easy matter if it appeared in epidemic form. It is not unusual to see rats enjoying the high-ways and by-ways in this city. The deplorable state of affairs with regard to some of the streets is evident to the most casual observer. If one rides along Dryades street, he will immediately be struck by the possibilities with regard to the development of an epidemic of plague. I have very often observed rats running along on top of the gutters near the street-car tracks. It would seem advisable for the city authorities to bend every effort in an endeavor to make this a rat-proof city insofar as that is possible. When we consider the possibility of imported cases in connection with the more or less ideal state of affairs for the development of an epidemic, we should not hesitate to expend the necessary funds in order to protect the city from the devastations of a severe epidemic of bubonic plague. I think we all appreciate very much the very careful and exact work that is done by the United States Public Health Service, and were it not for their constant vigilance, I am sure that the city of New Orleans would not be so free from plague as it is.

In carrying out preventive measures during an epidemic, three cardinal points are to be kept in mind. First, the necessity of absolute authority; second, the need of sufficient funds; and last, but not least, the proper knowledge of the work to be undertaken, which includes not primarily the clinical picture of a case of plague, but the life habits of the rat and the flea; and in order to obtain results there must be a complete co-operation between the medical officer and the sanitary engineer.

CLINIC OF DR. DANIEL N. SILVERMAN

TOURO INFIRMARY

A CLINICAL METHOD FOR THE QUANTITATIVE DETERMINATION OF STOOL REACTION

THE clinical value of estimating the quantitative reaction of stools has recently been emphasized by Foreman, Pennington, and Funkhauser.[1] These authors have attempted to show that the hydrogen-ion concentration of feces does not fall within narrow limits as they had suspected, but, instead, varies greatly in their range of reaction. In their attempt to determine the *p*H of various types of stools, it was found that the formed stool, described by F. L. Burnett as normal, has invariably shown a *p*H of 7.0 to 7.5 (neutral to moderately alkaline). The soft, gassy stool has shown an acidity varying from *p*H 5.0 to 6.5. A colorimetric method was used for making the tests. The technic used in their observations has required trituration of the stool with distilled water, which is followed by centrifugalization at high speed for thirty minutes, and subsequent filtration into the test-tubes. Certain indicator solutions were used for the colorimetric readings. In order to avoid the influence on color reaction of the bile-pigment constant in stools, the control solution, with proper indicator added, is superimposed upon the stool filtrate. This is compared with the other tube of stool filtrate with only indicator added. The complexity of such a procedure in clinical practice, obviously necessitating considerable time and much apparatus, has prompted me to devise a more simplified, but accurate method as a means for determining the hydrogen-ion concentration of stools. For this purpose test-papers are utilized in the clinical laboratory. The employment of test-papers for biologic fluids has been described by McClendon[2] and others.

In a previous communication Denis and the author[3] described a rapid method by the use of papers impregnated with certain indicator dyes (for testing the *p*H of gastric contents). At first it was believed that the bile-pigment concentrated in stools might alter the true color-change, produced by the action of feces on indicator solutions. Therefore, it was thought best to select those dyes, whose color ranges would not be shades of yellow or green. Since the hydrogen-ion concentration of practically every specimen of stool will fall within the range 5.5 to 8.0, bromcresol purple and phenol red were selected as the most suitable indicators. Bromcresol purple represents the acid ranges 5.6 to 7.0, by a series of color changes ranging from a grayish-blue to a purplish-blue. Phenol red represents the range 6.8 to 8.0 (alkaline), by a series of color changes ranging from pink to deep red. The test-papers are prepared as follows: .1 per cent. alcoholic solutions of the dyes (bromcresol purple and phenol red) are poured over separate sheets of plain white, ash-free filter-paper. Only the highest grade of smooth "quantitative" filter-paper should be used. The papers are dried by allowing the excess dye to drain off, and then suspending them in the air, avoiding the sunlight. When perfectly dry, the indicator papers are cut in narrow strips and placed in separate glass vials in a dark place.

A fresh specimen of stool collected in a clean glass receptacle, uncontaminated by water or urine, is selected for the *p*H determination. The stool is thoroughly stirred in a sufficient amount of distilled water to make a liquid paste. Two or 3 drops of this material is placed on one side of a strip of phenol-red paper. If there is a color reaction on the opposite side of the test-paper, this reaction is compared with color changes produced by placing a known buffer solution (ranging 6.8–8.0) on strips of the paper. Should there be no effect on phenol red the specimen must then be acid. The degree of acidity is determined by similarly treating a piece of bromcresol-purple paper with the stool emulsion. The color change is compared with the colors produced by the action of the known buffers (ranging 5.6–7.0). Following the treatment of a test-paper with

the stool mixtures, it is necessary to wait two or three minutes for the development of the maximum color-intensity before making comparison with the fresh control colors.

The simple method herein described has checked in accuracy with other colorimetric procedures used in the determination of hydrogen-ion concentration of stools. The value of such determination for intensive diagnosis having been established recently by several workers, the above test is recommended for the routine analysis in the clinical laboratory.

BIBLIOGRAPHY

1. Foreman, Pennington, and Funkhauser: Trans. Sect. Gastro-enterol. and Proctol., Amer. Med. Assoc., pp. 29–38, 1925.
2. McClendon: Amer. Jour. Physiol., 38, 191, 1915.
3. Denis and Silverman: Amer. Jour. Med. Sci., 169, 26, 1925.

CLINIC OF DR. SAM HOBSON

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A BLOOD DYSCRASIA-DIARRHEA CASE PRESENTED AS A DIAGNOSTIC PROBLEM

MISS O. E., white, female, age thirty-six.

Complaint.—Diarrhea and general weakness.

Present Illness.—Began about four years ago with a severe diarrhea, ten to twenty stools a day. The character of the bowel evacuations was not noted at the onset. After a course of four weeks, she was somewhat relieved by paregoric and bismuth, visited the mountains of North Carolina, regained the weight (about 15 pounds) that she had lost, but continued having as many as six, and no less than four bowel movements a day. During all this period she complained of sore mouth and a sore tongue, which latter she described as being very red most of the time. She consulted numerous physicians, had various blood examinations, was told she had anemia, but showed no improvement. Two weeks before admission to the hospital, her bowel movements varied in number between ten and fifteen in twenty-four hours, each evacuation being "copious, very soft, grayish-white, foamy, and of a peculiar sour odor." In September, 1926, she was admitted to the hospital in a precarious condition. She was unable to walk about, vomited continuously, and was having an average of fifteen bowel movements in twenty-four hours.

Physical Examination.—White female, about thirty-six years of age, well developed, but markedly emaciated. Skin is dry, inelastic, of a dark, yellowish tint. She is mentally fairly alert, but there is a tendency to despondency. The hair is thin and dry. Pupils are equal, and react to light and accommodation,

the scleræ glisten, and the conjunctivæ are extremely pale. There are many teeth missing, those present being in fair condition. The mucous membrane of the mouth is pale, the tongue somewhat swollen, very red, and showing several leukoplaktic areas. The tonsils are negative. The glands of the neck are not palpable, and no distention of the vessels in the neck is noted. Thorax: The ribs and intercostal spaces are very prominent. The expansion is equal in both lungs. The chest is otherwise negative, except for a general hyperresonance. Heart: The apex-beat is visible in the fifth intercostal space just within the midclavicular line. No thrills or undue pulsations are noted. There is no enlargement. A loud systolic murmur is heard in the pulmonic area (hemic). The pulse is of good volume, but fast; the radial arteries are easily compressed. Abdomen: The abdomen is scaphoid, distended with gas, and, on palpation, gas bubbles can be felt passing beneath the fingers. The lower border of the liver is barely felt. The deep liver dulness begins in the fifth intercostal space. The spleen is not enlarged. Extremities: The arms and legs are much emaciated. Epitrochlear glands are palpable. All reflexes are negative, except a slight exaggeration of the knee-jerks. There is some paresthesia noted in the lower extremities and patient complains of a slight "numbness" in the left hand and arm, which she claims to have noted for the past two or three weeks. Temperature is 100.5° F.

Laboratory Examination.—Urinalysis negative. Feces: Negative for ova or parasites. Special attempts were made of reveal and cultivate fungi of the general class of Monilia. Gastric contents: Free hydrochloric acid, 0; total acidity, 9; otherwise negative.

Blood Wassermann, negative.

Blood-picture: Total red blood-cells, 950,000; hemoglobin, 30 per cent. (Dare); color index, 1.5; total white blood-cells, 2500; small mononuclears, 60 per cent.; large mononuclears, 8 per cent.; neutrophils, 30 per cent.; eosinophils, 2 per cent.

Anisocytosis, poikilocytosis, polychromatophilia, one nucleated red blood-cell found after prolonged search. Unfortunately, no attempt at micrometric, erythrocytic measurements

was made. This probably, as shown by Bell, Thomas, and Means,[1] would have proved of valuable differential import.

Treatment and Subsequent Course.—The day of admission patient was given a transfusion of 250 c.c. of similar type blood. She was placed on a full, high caloric diet, but was able to retain very little food. There was a slight improvement in the blood-picture after the transfusion, but her general condition was unimproved. In three weeks a second transfusion of 400 c.c. of blood was performed, and a typical Minot-Murphy[2] regimen was instituted, except that the purin-derivative content was about 0.75 gm. per day, and to this diet was added bananas and Mead's protein milk. The banana content of the diet was increased to as many as twelve to fourteen per day. At the end of the second week of such regimen the blood-count showed: Total red blood-cells, 2,225,000; hemoglobin, 45 per cent.; color index, +.

The patient improved steadily, the number of the stools diminished, and their character showed marked improvement. The diet was continued with no change. She gained weight and left the hospital after ten weeks, at which time the blood-count showed: Total red blood-cells, 4,490,000; hemoglobin, 80 per cent.; color index, 0.9; total white blood-cells, 8500; small mononuclears, 20; large mononuclears, 4; neutrophils, 76; no change in red blood-cells noted.

Repeated attempts to demonstrate and cultivate Monilia from intestinal evacuation and scrapings from tongue proved futile. The bowel movements decreased to an average of two a day, and have so remained. Patient has gained 40 pounds, has no more sensations of "numbness," the tongue appears normal, she feels and looks well and is active. Her blood-picture, made a few weeks ago, showed the following: Total red cells, 5,000,000; hemoglobin, 85 per cent.; color index, 0.85; total white cells, 9000; small mononuclears, 25 per cent.; large mononuclears, 3; eosinophils, 1; neutrophils, 70.

No changes have been made in her diet to date.

Here, then, is a case showing persistent diarrhea, with copious, clay-colored, frothy stools, marked anemia with a color

index above 1, achylia, and glossitis. Clinically the case has recovered, and has had no remissions after the establishment of a moderately high purin-protein diet, to which was added bananas.

How can we classify this case? Is it pernicious anemia? Is it sprue? Or is it the manifestation of a toxic symptom-complex, at times called sprue, at times called pernicious anemia?

The principal theories of sprue, even the well-known, will here bear reviewing. Thin thought the condition due to a specific micro-organism. To Ashford[3] it is a mycosis superimposed upon a state of deficiency in certain essential food-elements. Monilia psilosis (Ashfordi) (Para Saccharomyces Ashfordi) as a causal factor has strong adherents. Experimentally, even though low in pathogenic properties, Monilia psilosis, according to Smith[4] and others, produces lesions in lower animals. To Scott,[5] a diet with an excess of fat and proteins by stimulating gastric hyperacidity, causes an over-production of secretin, which latter, in turn, causes hyperactivity of the pancreas, with increased fatty acids in the bowels and a resultant intestinal toxemia. Calcium is lost in the form of the calcium salts of these fatty acids, and derangement of the physiology of the parathyroid and salivary glands results. To others, Elders[6] especially, general dietary deficiency is the significant etiology.

As to pernicious anemia, a number of causal theories have been advanced, none, however, definitely provable or acceptable. The concensus of opinion seems to ascribe pernicious anemia to some type of toxin, hemolytic in nature, and having certain affinities and selective action for cord tissue, the place of origin of this toxin being probably the digestive canal.

The relation between sprue and pernicious anemia, and the possibilities of the two conditions being one and the same, is not a new thought. Thin, possibly first, Wood,[7] Elders, Libman,[8] Musser,[9] even Ashford,[10] have all pointed out the similarity of the two complexes. Some, Wood especially, even assert and attempt to prove the theory that the two conditions are one and the same. No such attempt is to be made here. It is simply desired to record this case with its many interesting features, achylia, symptoms of cord change, glossitis, etc., with the hope

that further observation and correlation of such and similar information may in time tend to clear the present perplexing problem of sprue versus pernicious anemia.

BIBLIOGRAPHY

1. Bell, J. R., Thomas, F. K., Means, J. H.: Jour. Clinical Investigation, 1926, 3, 229.
2. Minot, G. R., and Murphy, W. P.: Jour. Amer. Med. Assoc., 1926, 87, 470.
3. Ashford, B. K.: Amer. Jour. Med. Sci., 1917, 147, 54.
4. Smith, L. W.: Jour. Amer. Med., 1924, 83, 000.
5. Scott, A. K., and Silving: Trans. Soc. Trop. Med. and Hyg., 1923.
6. Elders, W.: Lancet, January 10, 1925, p. 675.
7. Wood, E. J.: Southern Med. Jour., 1925, 18, 157.
8. Libman, E.: Jour. Amer. Med. Assoc., 1925, 84, 000.
9. Musser, J. H.: Med. Clin. of N. Amer., 1926, 9, 895.
10. Ashford, B. K.: Annals Clin. Med., 1925, 4, 13.

CLINIC OF DR. LEON J. MENVILLE

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THE APPLICATION OF MODERN METHODS IN THE STUDY OF THE VISUALIZED GALL-BLADDER BY MEANS OF THE ROENTGEN RAYS

THE proper diagnosis of the character and extent of gall-bladder disease has long occupied a position of debate and discussion. Progress in both clinical and laboratory methods have, from time to time, added new facilities to aid in the elucidation of the existent pathology in this rather obscure condition.

While acute fulminating and violent lesions of the gall-bladder usually demonstrate a syndrome which is capable of diagnosis in a similar manner to the vermiform appendix, it is the low grade, chronic lesions with varied and uncertain symptomatology that have formed a vexatious and more or less unsatisfactory picture to both the internist and surgeon. It is the purpose of the present clinic to discuss particularly the lesions demonstrating subacute and chronic phenomena, especially from the radiologic standpoint.

Gall-bladder disease, as is well known, is a common condition, and is very often confused with certain diseases of the gastro-intestinal tract, making the diagnosis difficult. This is particularly noticeable in those obscure digestive disorders that are the result of a diseased gall-bladder, in which instances the secondary resultant conditions assume the predominant rôle, overshadowing and obscuring the latent, but essential cause. Any diagnostic methods, therefore, that are of service in the diagnosis of gall-bladder disease, are naturally to be considered of importance.

The Roentgen-rays have been employed for a long time in the diagnosis of disease of the gall-bladder, but until recently elicited only little information. Before the present modern methods were

employed, gall-stones were visualized in about 30 to 40 per cent. of cases, and the gall-bladder proper was demonstrated only rarely in certain instances, in which the biliary content was greatly inspissated or the walls were thickened or calcified. Without actual visualization of the gall-bladder itself, the diagnosis of disease of this organ was, heretofore, based upon certain indirect signs, such as deformity of the duodenum from pressure of an enlarged gall-bladder, alteration in the position of the stomach due to adhesions to this structure and other collateral data. As these same indirect signs are often present in conditions other than gall-bladder disease, it is apparent that they could not be fully relied upon for diagnosis. In conjunction with the radiologic findings, it was necessary to rely in great part upon the clinical signs and symptoms in attempting to arrive at a final diagnosis. Thus, it can be seen that the results offered by Roentgen-ray examination alone were not, as a rule, pathognomonic of gall-bladder disease.

The discovery of Graham and Cole,[1] in 1924, that when the sodium salt of tetrabromphenolphthalein was injected intravenously, it was in great part eliminated from the liver in conjunction with the biliary secretion, and the accumulation of this substance rendered the gall-bladder opaque to the Roentgen-rays. Through the employment of this method it can be appreciated, that very valuable data concerning this structure can be obtained, for example, its contour, size, shape, position, and the density of shadow. In addition to these physical observations, important information can also be obtained from the physiologic standpoint relative to the appearance time of the dye in the gall-bladder, and the period of time necessary for the emptying of this organ.

The sodium salt of tetrabromphenolphthalein, first used by Graham and Cole, was later replaced by the sodium salt of tetra-iodophenolphthalein, as this drug was found to cast a better shadow and with a smaller dose. The tetra-iodophenolphthalein casts a denser shadow as a result of its iodin content. The atomic number of iodin is 127, and its approximate absorbability rate is 6026.432, yielding, thereby, a shadow six times greater than

bromin. The absorbability rate here given is calculated according to the comparative method previously reported by the writer.[2] Again, there is 59 per cent. of iodin in the tetra-iodophenolphthalein. This reduction in the dosage of the dye is important, especially when it is administered intravenously as it lessens the reaction that occasionally follows this method of administration. Very recently Kendall[3] of the Mayo Clinic, has discovered a new drug for cholecystography, namely di-iodo-di-ethyl ether of di-salicylphthalein. It is claimed that it will not produce vomiting or bowel disturbances, and the roentgenogram of normal gall-bladder shadows obtained with this chemical appear denser than with the usual dyes. This work, however, is, as yet, in the experimental stage, having been used in only 35 cases, and the drug is not at present available in the open market.

As regards the contraindications of the sodium salt of tetra-iodophenolphthalein, we were formerly cautioned against its use in cardiac conditions. In this connection, it is of interest to note the recent report of Reid and Kenway[4] relative to the effect of tetra-iodophenolphthalein upon the heart's action. They administered this drug to 13 cases, and studied the heart's action by electrocardiographic tracing. They conclude "that the injection of tetra-iodophenolphthalein does not have any significant effect upon the heart."

The two main routes of administering the dye in the Graham and Cole method of cholecystography are by mouth and intravenously. The oral route at present is most frequently used, because of its simplicity of administration without any loss in the efficiency of its results. While nausea and vomiting occur in a few cases, on the other hand, no constitutional reaction is manifested as may at times be shown in the intravenous method. Where doubtful results have been obtained, wherein either no shadow or only an imperfect one has been demonstrated by the oral administration, a check should be made by the intravenous route. This does not apply where the patient has vomited the capsules or they have been undissolved, in which instances the test should be repeated.

The application of the Graham and Cole method has spread quite generally and the results, as a whole, have demonstrated its accuracy in the diagnosis of gall-bladder disease. It has been proved to be of such distinct advantage in this form of radiologic examination that it has supplanted the former rather unsatisfactory procedure.

Since the advent of this method of cholecystography, I have had the occasion to carry out approximately 200 such examinations. This procedure in our experience, as for many other radiologists, has proven of the greatest value.

It is my desire to present a few typical instances which are representative of the value of this method. In these particular cases the dye was administered by mouth in capsules. In our work with this method, the following procedure is the one that is employed by us. The patient is instructed to take a light dinner, fat-free in character, at 5 P. M. The number of tetraiodophenolphthalein capsules varies from eight to ten (each containing 5 grains of the dye) dependent upon the body weight of the patient. The patient is put to bed at 9 P. M., and is given, at this time, two capsules every fifteen minutes, until all are taken. He is instructed to lie on the right side, and to drink freely of cool water while taking the capsules. The purpose of these latter procedures is to aid in the passage of the capsules from the stomach into the intestine before they dissolve. Following the meal at 5 P. M., no food is given until eighteen hours after the administration of the capsules.

The first skiagraph is taken at 9 A. M. the following morning, at which time some visualization of the gall-bladder should be shown if this structure is normal. Its appearance at this time, however, does not signify that the gall-bladder is normal, but on the other hand its failure to appear is indicative of pathology. At 3 P. M., or six hours afterward, another skiagraph is taken, which should demonstrate the shadow of greatest density. Following this examination, the patient is given a fatty meal, as originally suggested by Whitaker.[5] One hour after the completion of the meal, another skiagraph is taken for the purpose of noting the effect of digestion upon the gall-bladder shadow. At

the thirty-sixth hour following the ingestion of the dye, another skiagraph is made to ascertain if the gall-bladder has completely drained the dye. If such is not the case, the skiagraphic examinations are continued from time to time, until the emptying time is ascertained.

CASES

Case I.—Patient fifty-six years old, white male, was examined for gall-bladder disease by means of the dye method. The patient was a physician and considered that he was suffering from chronic gall-bladder disease.

Fig. 111.—Case I. Visualized gall-bladder at the twelfth-hour examination.

Chief Complaint.—Slight distress in the epigastrium, heaviness after eating, accompanied by belching.

Roentgen-ray Examination.—Patient was given the usual number of tetra-iodophenolphthalein capsules twelve hours before the first skiagraph was made. A distinct shadow of the

Fig. 112.—Case I. Visualized gall-bladder at the eighteenth-hour examination, which was the maximum time of concentration.

Fig. 113.—Case I. Reduction of nearly one-half of the shadow of the visualized gall-bladder as the result of digestion. Skiagraph taken one hour after the fatty meal, and nineteen hours after ingestion of the capsules.

gall-bladder was visualized at this time. The second Roentgen-ray examination was made six hours after the first, and showed a regular, dense shadow of the gall-bladder, normal in size, shape, and position. One hour after partaking of the fatty meal, another skiagraph was made which showed that the shadow of the gall-bladder was reduced nearly one-half in size. The last Roentgen-ray examination was made thirty-six hours after the original time of the administration of the capsules, and the gall-

Fig. 114.—Case I. The thirty-sixth-hour examination demonstrating the absence of gall-bladder shadow, the result of normal emptying of this structure of the dye-impregnated bile.

bladder shadow could no longer be visualized, having in the meantime drained the dye (Figs. 111–114).

This case represents an instance in which gall-bladder disease was strongly suspected, but by means of this method a normally draining gall-bladder was revealed.

Case II.—Mrs. A., age thirty years, was referred for Roentgen-ray examination of the gastro-intestinal tract, including the gall-bladder and the genito-urinary tract.

Chief Complaint.—Pains in the upper right quadrant, which radiate to the right shoulder and back.

Present Illness.—Patient has suffered pains in the back and left side for the last twelve years. About three months ago she was seized with violent pains in the right hypochondriac region, which radiated to the right shoulder. Two days later she developed a mild case of jaundice, with yellowish discoloration of

Fig. 115.—Case II. Four skiagraphs were taken of the gall-bladder region after the administration of the dye. The gall-bladder was not visualized. Only one skiagraph is presented.

the sclera. The pains returned at different intervals, requiring, at times, the use of opiates.

Roentgen-ray Examination.—Stomach, duodenum, and colon negative for any organic disease. Appendix: Chronic appendicitis.

Gall-bladder: Patient was instructed to take the usual number of capsules, and the Roentgen-ray examinations were made at

the twelfth, eighteenth, and thirty-sixth hour, and at no time was the gall-bladder visualized (Fig. 115).

Genito-urinary tract was negative for calculus.

Operation.—Gall-bladder and appendix removed and the pathologic report was: Chronic cholecystitis and chronic appendicitis.

This case demonstrates, as proved by operation and pathologic examination, an instance in which non-visualization of the gall-bladder by the dye method was significant of a chronically diseased gall-bladder.

Case III.—Mrs. M., age thirty-five years, mother of two children, was referred for a Roentgen-ray examination of the gall-bladder.

Fig. 116.—Case III. Four skiagraphs were taken in this case after partaking of the capsules, and the gall-bladder was never visualized. Note the absence of biliary calculi which were present at operation and found to be cholesterin in type.

Chief Complaint.—Pain in the upper right quadrant of the abdomen, associated with jaundice.

Present Illness.—Began two years ago with pains in the upper right quadrant. The pains were not constant, coming only at intervals. She later developed jaundice, and was brought to a hospital for operation.

Roentgen-ray Examination.—The routine number of capsules containing the dye was given the patient. Skiagraphs were taken at the usual time, namely, the twelfth, eighteenth, and thirty-sixth hour, and the gall-bladder was never visualized.

Operation.—Drainage of the gall-bladder; removal of a large number of gall-stones, one of which was found in the cystic duct near the entrance to the gall-bladder. The cystic duct was not dilated, but the gall-bladder walls were thickened.

In this instance, the reason for a non-visualized gall-bladder was the impaction of a gall-stone in the cystic duct, preventing the bile, impregnated with dye, from entering the gall-bladder. The stones presented herein were of the cholesterin type, and could not be demonstrated by the ordinary Roentgen-ray examination, nor could their presence be detected through negative shadows by the new method, because of the lack of visualization of the gall-bladder.

Case IV.—Mrs. D., age twenty-nine years, mother of three children, one living and two dead.

Chief Complaint.—Pain over the gall-bladder region, referred to the scapula. Heaviness in the epigastrium, relieved by vomiting.

Present Illness.—Operated upon eleven years ago, and cholelithotomy performed. An umbilical hernia, and generative tract were repaired at the same time. Since then the patient has been suffering from pains in the upper right quadrant of abdomen, accompanied by a heavy feeling in the epigastrium, which is relieved by vomiting. Up to a year ago, patient maintained her average weight, but has been losing weight ever since. Appetite is poor, and constipation is present.

Roentgen-ray Examination.—After the administration of the usual number of capsules containing the dye, an examination was made at the twelfth, eighteenth, and thirty-sixth hour

periods. We were unable to visualize the gall-bladder, although several gall-stones were demonstrated (Fig. 117).

Operation.—Gall-bladder was completely hidden in a mass of omental adhesions, which was freed and the gall-bladder removed. Several gall-stones were found.

Fig. 117.—Case IV. The dye was administered in the usual manner in this case, and the gall-bladder was not visualized. Note the presence of several biliary calculi which were of the type opaque to the Roentgen-ray.

Diagnosis.—Chronic cholecystitis and cholelithiasis.

This case is somewhat analogous to Case III, except that the stones present were not of the permeable cholesterin type, and consisted of that group demonstrable by ordinary Roentgen-ray method.

Case V.—Mrs. W., age about thirty-eight years, was referred for a Roentgen-ray examination of the gall-bladder.

Chief Complaint.—Heaviness after eating, with belching and a feeling of burning in the epigastrium. Dull ache over the gall-bladder area.

Present Illness.—Patient has had three severe attacks of pains over the upper right quadrant of the abdomen, becoming more severe at each attack.

Roentgen-ray Examination.—Eight capsules of the dye were taken by the patient, beginning at 9 P. M., and the first examination made at the twelfth hour. A shadow of the gall-bladder was seen at this time, which was somewhat indistinct, and in this

Fig. 118.—Case V. The gall-bladder was first visualized at the twelfth hour, and the period of greatest density was at the eighteenth hour. Note several cholesterin gall-stones as negative shadows. This type of gall-stones cannot be demonstrated by the ordinary Roentgen-ray method.

shadow were several areas of rarefaction. The second examination was made six hours after the first, and a well-defined, rounded gall-bladder shadow was noted. In the gall-bladder shadow were the same areas of rarefaction as in the first skiagraph, but much better defined. These rarefied areas are gall-stones, which are demonstrated by this

displacement of the dye. Digestion had very little effect upon the shadow. The thirty-sixth hour period showed that the gall-bladder still retained some of the dye (Fig. 118).

Operation.—Gall-bladder was drained, and several soft gall-stones were removed. This is the type of case demonstrating that cholesterol stones can be visualized when surrounded by dye-impregnated bile. In no other manner could these stones be shown on a Roentgen-ray plate.

Case VI.—Mr. W. I., age twenty-four years, was referred for a Roentgen-ray examination of the gall-bladder by the dye method.

Fig. 119.—Case VI. The first Roentgen-ray examination, made twelve hours after ingestion of the capsules, shows an indistinct gall-bladder shadow.

Chief Complaint.—Slight soreness in the midepigastrium with heaviness after eating, which was followed by some belching, regurgitation, and occasional "heart-burn."

Present Illness.—Patient sick for the last three years, illness

Fig. 120.—Case VI. Eighteenth-hour examination, showing period of greatest density.

Fig. 121.—Case VI. The nineteenth-hour examination, one hour after the fatty meal, shows no reduction in the size of the shadow.

beginning with an attack of acute catarrhal jaundice, accompanied by localized sensitiveness under the right costal margin in the midclavicular line.

Roentgen-ray Examination.—Twelve hours after taking the usual number of capsules, the first examination was made, and a large gall-bladder shadow was obtained. A shadow of greatest density was seen on the second skiagraph, taken six hours after the first. One hour after ingesting the fatty meal, another skiagraph was taken, and the shadow of the gall-bladder was not affected by the meal. The gall-bladder shadow persisted at the thirty-sixth and forty-second-hour periods (Figs. 119, 122).

Fig. 122.—Case VI. The thirty-sixth-hour examination shows the dye still in the gall-bladder.

Operation.—The gall-bladder was distended, and failed to empty on pressure. The wall of the organ was very much thickened, and the blood-vessels distended. The gall-bladder was opened after removal, and its mucosa was found intensely red and granular. This case represents one where the gall-

bladder was visualized throughout the examination, failing to respond to digestion and normal drainage.

The cases presented herein have been chosen as representative instances to demonstrate the greater value of the application of the Graham and Cole method in gall-bladder diagnosis, as compared to our previous facilities employed in such examinations.

In this connection, it may be of value to mention certain of the results reported by other workers in this field. Moore[6] reports the cholecystography of 552 cases, studied, at the Barnes Hospital, by both the oral and the intravenous methods. One-hundred and five of these were submitted to laparotomy, 82 of which required cholecystectomy; in the remaining 23 instances, other operations were performed, at which the gall-bladder was observed and the condition noted to be normal. In these cases the surgical operation confirmed the Roentgen-ray diagnosis in 95.5 per cent. of these 105 cases. Brans[7] reports that in 100 cases of oral administration of the dye, 43 of these were proved correct at operation, and 2 were incorrect; the remaining 55 were not operated upon, but in these the clinical and Roentgen-ray diagnosis agreed. Carman[8] of the Mayo Clinic, in an early report, states that of 39 patients subjected to this method, 34 showed evidence of gall-bladder disease. All of these were subsequently operated upon, and pathology of the gall-bladder was found.

The visualized gall-bladder has been the subject of experimental studies which have brought forth many interesting facts. Among these is the work of Silverman and Menville,[9] which has shown that non-surgical biliary drainage produces a reduction in the size and alteration of the shape of the visualized gall-bladder. This work has been confirmed by Comstock,[10] Eberhard,[11] Sasman, Whitaker, and Edson,[5] and Whitaker.[12]

The appearance and emptying time of a normal gall-bladder shadow is dependent upon whether the dye has been administered by the intravenous or peroral route. The period of greatest density occurs a few hours after the appearance of the shadow.

Whitaker[13] observed that a meal consisting of fats, given to a patient whose gall-bladder is normally visualized, will cause a reduction of nearly one-half of its shadow within the period of one hour. The radiologic observations made of the pathologic gall-bladder with the dye method have resulted in the following deductions: (1) A non-visualized gall-bladder is strongly suspicious for disease of this structure. (2) A slowly emptying gall-bladder that does not respond to a fatty diet is indicative of abnormal physiologic function. (3) A small, contracted, slowly emptying gall-bladder with poor concentration is highly suggestive of pathology of this structure.

There are various factors that may cause failure of visualization of the gall-bladder. Any obstruction of the cystic duct, either by stone, angulation, bands of adhesions, and a swollen mucous membrane. Again the contents of the gall-bladder may be composed of thickened mucus or inspissated bile, and may fail to mix readily with the dye-impregnated bile. The walls of the gall-bladder may be so thickened, and the lumen so contracted that there is not sufficient bile retained to cast a shadow. The gall-bladder may be so large, or the amount of the contents so great (as in hydrops) that the opaque bile is diluted to such an extent, that it does not outline the gall-bladder satisfactorily. The liver function may be so poor as to delay or entirely prevent a sufficient amount of impregnated bile from entering the gall-bladder.

As regards the value of this method in the diagnosis of gall-stones, it has been found that the dye method of examining the gall-bladder with the Roentgen-rays permits cholesterin stones to be visualized. On account of the low absorbability rate of these types of stones, we have, heretofore, been unable to obtain their shadows by radiologic methods. Their absorbability rate is about 98.06, which is less dense than the liver shadow. In these cases, through the employment of the modern dye method, the opaque bile surrounds the stones in such a manner that they can be recognized by negative shadows, that is to say, that a rarefaction of the shadow cast by the dye occurs through its displacement by such stones. Previous to the advent of the dye

method of visualizing the gall-bladder, the percentage of reported gall-stones with the Roentgen-ray was from 30 to 40 per cent., and none of these were of the cholesterin type. This percentage has been greatly increased and now includes all types of biliary calculi.

From the above reported observations, in conjunction with the consideration of numerous other such cases studied in routine radiologic work, the following may be deduced.

CONCLUSIONS

1. A normal gall-bladder may be visualized, and its drainage function studied through the employment of the Graham and Cole method.

2. Abnormalities observed relative to its drainage, irregularities in its shape and contour, together with failure of visualization through the employment of this method, are indicative of gall-bladder pathology.

3. Its employment in gall-bladder examination permits a greater percentage of correct conclusions than was hitherto possible.

4. Cholesterol stones are visualized only by cholecystography, through the negative shadows obtainable by this method.

5. In our hands the application of this method of cholecystography has been found to be a safe procedure.

BIBLIOGRAPHY

1. Graham, E. A., and Cole, W. H.: Roentgenologic Examination of the Gall-bladder, Jour. Amer. Med. Assoc., 1924, lxxii, 613, 614.
2. Menville, L. J.: Experimental Work Bearing Upon the Standardization of the Absorptive Powers of the *x*-Rays by Salts of the Various Metals, Jour. Radiology, 1924, iii, p. 124.
3. Kendall cited by Kirklin, B. R.: A New Dye for Oral Cholecystography, Radiologic Review, vol. 4, No. 1, January 1927, p. 29 (editorial).
4. Reid, W. D., and Kenway, F.: The Action of Tetra-iodophenolphthalein on the Heart, Jour. Amer. Med. Assoc., 1927, vol. 88, pp. 540, 541.
5. Sasman, M. C., and Whitaker, L., and Edson, P. J.: Clinical and Experimental Cholecystography, Jour. Amer. Roentgenology and Radium Therapy, 1925, xiv, 495.
6. Moore, Sherwood: Cholecystography with Especial Reference to Its Employment on Ambulatory Cases, Southern Med. Jour., 1926, xix, 106.

7. Brans, Julius: The Oral Administration of Sodium Tetra-iodophenolphthalein for Cholecystography, Radiology, 1926, vol. 1.
8. Carman, Russell, D., and Counsellor, Virgil S.: Roentgenologic Diagnosis of Cholecystic Disease with the Aid of the Sodium Salt of Tetrabromphenolphthalein, Jour. Amer. Roentgenology and Radium Therapy, 1924, xii, 403.
9. Silverman, D. N., and Menville, L. J.: Observations of the Visualized Gall-bladder by Graham Method, Jour. Amer. Med. Assoc., 1925, vol. 84, pp. 416–18.
10. Comstock, C. R.: (Personal communication to Lyon, B. B.) Jour. Amer. Med. Assoc., November 14, 1925, vol. 85, pp. 1541–48.
11. Eberhard, H. M.: (Personal communication to Lyon, B. B.) Jour. Amer. Med. Assoc., 1925, vol. 85, p. 1541.
12. Whitaker, Lester: Experience with Cholecystography Including Observations on the Function of the Gall-bladder, Jour. Amer. Med. Assoc., 1926, vol. 86, 239.
13. *Loc. cit.*